

THE "OVEREDUCATED" GREEK,
THREE ESSAYS IN HUMAN CAPITAL THEORY

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ABSTRACT

Although this dissertation consists of three independent essays, the underlying objective which initiated this research was to examine whether human capital theory by itself could (a) explain the phenomenon of the "overeducated" Greek and (b) offer any social investment criteria for educational planning.

Although the first objective has been met (and is the subject matter of the first essay) the appropriateness of the human capital social investment criterion (the social rate of return to education) has been challenged by the so called "screening" hypothesis which is especially strong if considered in the context of hierarchically organized "internal labour markets".

Disillusionment with the social rate of return led to an analysis of the "internal labour market" concept and an attempt to elucidate its relationship (if any) with human capital theory (the subject of the second essay).

Lastly another version of "screening", this time by sex is explored in the context of "internal labour markets" and its predictions are tested against those of the labour supply (human capital) theories by means of a three company sample drawn personally from the Greek Manufacturing Industry (the subject matter of the third essay).

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CHAPTER 1

INTRODUCTION

The exceptional propensity for higher education has been one of the distinguished features of the Greek society which can be traced back to the early years of the independent Greek State in the first half of the nineteenth century. As early as 1847, Buchon in La Grèce Continentale et le Morée (Paris, 1847) observed :

"The least sophisticated Greek whom you employ for reading and conversation in his language, will put aside what little he earns by this to go and get his law degree in Paris. Hire a servant and he will save up to study medicine at Pisa." 1

More recently, H. Leibenstein, during his short visit in Athens, in 1966, was also impressed with the Greek educational performance. An examination of the comparative figures presented in Table 1 led him to conclude:

"If we compare the proportion in various age groups in school in Greece with other countries at its economic level, then Greece does as well or better than most. This is true not only in the primary and secondary level, especially if we include Greeks studying abroad. Even if we compare the proportion in each age group attending school or university in Greece with Western European countries, we find that

1. Mentioned by K. Andrews, Athens. London: Phoenix House, 1967, p. 75.

Greece does better than a great deal many of them and as well as most." 1

As was noted by Leibenstein, the number of Greeks studying abroad has been spectacularly high. In 1961, as Tables 2 and 3 show, 8800 Greeks, representing 24% of the total number of students in higher education were enrolled in higher educational institutions abroad.

By 1975, as Table 4 demonstrates, this number has nearly tripled and according to Table 5, Greece is ranked third in the world with respect to the number of students studying in foreign higher educational institutions, after the US and Iran. Italy, because of its proximity and relative cheapness, has been the most favoured destination, followed by Germany, France, Britain and the US. A curious recent development has been the flow of Greek students, attracted by rock bottom costs, to communist countries like Czechoslovakia, Romania and Bulgaria.

It is thus obvious that the extremely marked propensity among Greeks toward higher education is, comparatively, even higher than the image presented by international statistics. Whatever theoretical or methodological objections one might have towards linear projections, it is interesting to note that according to OECD, by 1985, Greece might have up to 94% of her youth enrolled in institutions

1. H. Leibenstein, "Returns to Education in Greece: A Discussion of Results and Policy Implications." Development Advisory Service, Economic Development Report No. 94. Cambridge, Mass.: Center for International Affairs, Harvard University, 1967, p. 2.

TABLE 1
COMPARATIVE EDUCATIONAL DATA FOR GREECE AND
SELECTED OTHER COUNTRIES¹ (1961)

COUNTRY	Number graduating from secondary education as a % of relevant age group	Entrants to higher education as a proportion of number graduating from secondary general education	Number graduating from higher education as a % of relevant age group
GREECE	17.6	45	3.6
United States	65.5	50	16.9
Canada	38.0	40	6.9
Belgium	11.0	62	3.3
Ireland	13.0	40	n.a.
Great Britain	6.0	78	3.4
France	11.0	81	3.4
Netherlands	6.0	67	1.7
Norway	11.5	47	2.8
Sweden	11.0	67	4.3
U.S.S.R.	n.a.	n.a.	n.a.
Denmark	6.0	71	2.2
Switzerland	5.5	n.a.	4.7
Austria	10.0	56	1.7
Luxembourg	n.a.	n.a.	n.a.
Italy	6.5	60	2.6
West Germany	5.0	81	2.7
Spain	5.0	50	1.4
Yugoslavia	11.5	n.a.	4.3
Portugal	n.a.	n.a.	n.a.
Turkey	2.0	n.a.	n.a.

Source: Education and Development, Country Reports,
The Mediterranean Regional Project, Greece,
OECD, Paris, 1965, Table 8, p. 57.

TABLE 2
NUMBER OF GREEK STUDENTS IN HIGHER EDUCATIONAL
INSTITUTIONS ABROAD BY COUNTRY AND
BY TYPE OF STUDY (1961)

COUNTRY OF STUDY	TOTAL NO. OF GREEK STUDENTS	% STUDYING SCIENTIFIC AND TECHNOLOGICAL SUBJECTS	% STUDYING HUMANITIES AND SOCIAL SUBJECTS
Austria	2450	70.9	29.1
Germany	2130	60.9	39.1
Italy	1420	63.6	36.4
United States	1200	48.4	51.6
France	600	25.8	74.2
Switzerland	500	43.1	56.9
Others	500	51.0	49.0
TOTAL	8800	58.8	41.2

Source: The Mediterranean Regional Project, op.cit.,
Table 10, p.62.

TABLE 3
NUMBER OF GREEK STUDENTS ABROAD AS % OF THE
TOTAL NUMBER OF GREEK STUDENTS IN HIGHER
EDUCATION BY TYPE OF STUDY (1961)

TYPE OF STUDY	% STUDYING ABROAD
Scientific and Technological Subjects	33.2
Humanities and Social Sciences	17.0
All Students	24.0

Source: The Mediterranean Regional Project, op.cit.,
Table 11, p. 62.

TABLE 4
NUMBER OF GREEK STUDENTS STUDYING ABROAD BY COUNTRY (1975)

COUNTRY	NUMBER
United States	1910
France	2666
United Kingdom	2301
Canada	443
Germany	3395
Italy	10418
Austria	1011
Switzerland	361
Belgium	307
Spain	69
Australia	30
Romania	30
Czechoslovakia	115
Sweden	108
Yugoslavia	10
Denmark	17
Netherlands	39
Other	133
TOTAL	23363

Source: Figures taken from Statistical Yearbook 1977
 UNESCO, Table 5.7.

TABLE 5NUMBER OF FOREIGN STUDENTS BY COUNTRY OF ORIGIN (1975)

COUNTRIES	NUMBER OF STUDENTS STUDYING ABROAD
United States	29414
Iran	33021
Greece	23363
Hong Kong	21059
China	17201
United Kingdom	16866
Nigeria	16348
Malaysia	16162
India	14805
Italy	11251
West Germany	10759
Cyprus	10725
Japan	10506
Turkey	9541
Morocco	9344
Thailand	9092
France	9010
Spain	7444
Netherlands	4198

Source: Figures taken from Statistical Yearbook 1977
UNESCO, Table 5.7.

of higher education, followed up by the US with 75% of the equivalent age group and, at a distance, by all other developed countries.¹ Apart from the impressive number of students in higher education, the academic orientation of the Greek student body is very particular. Its main features are a striking preference for law and social sciences, coupled with a very pronounced reluctance to study technology and science. It is no coincidence that 60% of the places currently offered by Greek Universities are either Law, Economics and Political Science or Literature.² The only exception is civil, and to a lesser extent, mechanical and electrical engineering, which can be explained by the paramount importance of the construction industry in the Greek economy in the postwar period.³

The social composition of the Greek student body is also quite atypical. The degree of class selection in Greek Universities is exceptionally low. In a recent study based on a sample of approximately 2000 students of the University of Athens, J. Lambiri-Dimaki reports that 29% of

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1. OECD, Developpement de l'enseignement dans les pays de l'OCDE depuis 1950, Cahier II, pp. 131-7, Paris, 1971.
 2. The number of places offered by Greek Universities by special subject for the academic year 1978-79 is shown in Table 6.
 3. As reported by N. Vernadakis in his book Econometric Models for the Developing Economies: A Case Study of Greece. London: Saxon House, 1978, investment in dwellings accounted for 30 - 45% of total fixed capital investment in the period 1950 - 1966.

TABLE 6
PLACES OFFERED BY GREEK UNIVERSITIES
 (BY SPECIAL SUBJECT) FOR THE
ACADEMIC YEAR 1978-79

	<u>NO. OF PLACES</u>
1. <u>University of Athens</u>	
Department of Theology	175
Department of Law and Economics	1575
Medical School	310
Department of Literature	810
Department of Physics and Mathematics	805
2. <u>University of Salonica</u>	
Department of Theology	145
Department of Literature	700
Department of Physics and Mathematics	785
Department of Law and Economics	725
Medical School	310
Department of Engineering and Architecture (Civil, Chemical, Mechanical, Electrical)	440
Department of Forestry and Agriculture	165
3. <u>Athens Polytechnic</u>	
Engineering and Architecture	485
4. <u>University of Patras</u>	
Department of Physics and Mathematics	550
Department of Engineering	220
Medical School	60
5. <u>University of Ioannina</u>	
Department of Literature	250
Department of Physics and Mathematics	330
Medical School	60
6. <u>University of Thrace</u>	
Department of Law	300
Department of Engineering	200
7. <u>University of Crete</u>	
Department of Literature	100
Department of Physics and Mathematics	120

TABLE 6 (continued)

8.	<u>Athens School of Economic and Commercial Studies</u>	800
9.	<u>"Pantios" School of Political Science</u>	700
10.	<u>School of Industrial Studies (Piraeus)</u>	600
11.	<u>School of Industrial Studies</u>	800
12.	<u>School of Agriculture (Athens)</u>	165
TOTAL NUMBER OF PLACES		<hr/> 12675 <hr/>

Notes:

The figures were kindly provided by the Greek Statistical Service.

the students came from villages of less than 2000 inhabitants with another 13% from country towns of 2000 - 10000 inhabitants.¹ These percentages are particularly high if compared with the relative participation of lower classes in higher education in other countries. For France, for example, Bourdieu and Passeron² report that no more than 15% of the entire student body came, in 1961, from peasant or working class families, although peasants and workers represented more than 60% of the population. The exceptional degree of democratization of higher education led Tsoukalas³ to assert that Greece had the most open educational system among Western European countries. It is noteworthy also, that the Greek educational selection system being geared almost exclusively to the testing of memory and not to the testing of ability to think in a critical or original manner, ironically enough functioned in a relatively just way, in the sense that it allowed the hard working lower class children to succeed in the various entrance examinations without being in a disadvantageous position compared with children coming from more favourable family backgrounds.⁴

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1. J. Lambiri-Dimaki, Towards a Greek Sociology of Education (in Greek). Athens: National Centre for Social Research, 1974.
 2. P. Bourdieu and J.G. Passeron, Les Heritiers. Paris: Editions de Minuit, 1964.
 3. C. Tsoukalas, "Higher Education in Greece as a Mechanism of Social Reproduction", Devkalion, (in Greek), March, 1975, pp. 18-33.
 4. This point was noted by J. Lambiri-Dimaki in "Democratization of Education in Contemporary Greece", Epitheorisi Kinonikon Erevnon, 1st quarter, 1977, pp. 55-64.

Moreover, the phenomenon of over-education was not coupled with impressive sums of public funds to higher education. Table 7 demonstrates that as a percentage of GNP and as a percentage of total public expenditures, allocations to education have been the lowest among 17 OECD countries. The low budget allocations to education raise some doubts about the quality of education, which are immediately reinforced by the statistics of Table 8, which show that Greece has relatively high student - staff ratios as compared with the other OECD countries.

(i) The Demand for Higher Education in Greece:
Some Sociological Explanations

The impressive, albeit atypical, performance of the Greeks at the Higher Education level has, as expected, attracted the attention of sociologists (educational sociologists in particular).

In this section the attempt will be made to present briefly their arguments advanced to explain the phenomenon of the "over-educated" Greek. Although sociologists usually tend to stress factors such as prestige, power or status, in the case of Greece they have paid attention rather more to historical or institutional factors, as will be seen below.

TABLE 7
PUBLIC EXPENDITURE IN EDUCATION AS % OF GNP AND AS
% OF TOTAL PUBLIC EXPENDITURE FOR SELECTIVE
COUNTRIES (1975)

COUNTRIES	% OF GNP	% OF TOTAL PUBLIC EXPENDITURE
Austria	5.7	8.5
Belgium	6.2	22.1
Denmark	8.2	15.2
Finland	6.7	16.7
France	5.6	n.a.
West Germany	4.5	14.4
Greece	1.7	8.0
Ireland	6.5	10.8
Italy	5.0	11.7
Netherlands	8.7	23.7
Norway	7.1	14.7
Portugal	2.4	n.a.
Spain	1.7	1.1
Sweden	7.4	13.4
Switzerland	5.1	19.4
United Kingdom	6.2	14.0
United States	6.2	18.1

Source: Figures taken from Statistical Yearbook 1977,
 UNESCO, Table 6.1.

TABLE 8
NUMBER OF STAFF, STUDENTS AND STUDENT:STAFF RATIO
IN UNIVERSITY EDUCATION FOR 16 SELECTIVE COUNTRIES (1975)

COUNTRIES	NO. OF STAFF	NO. OF STUDENTS	STUDENT/STAFF RATIO
Austria	10001	86123	8.61
Denmark	4777	60106	12.58
Finland	5225	75765	14.50
France	40512	811258	20.02
Germany	103578	836002	8.07
Greece	5956	95385	16.01
Ireland	2261	22727	10.05
Italy	41824	968119	23.14
Netherlands	13000	120134	9.24
Norway	3757	40774	10.85
Portugal	4168	51489	12.35
Spain	22848	405869	17.76
Switzerland	5414	52623	9.71
Yugoslavia	14923	271517	18.19
Canada	30732	546769	17.79
United States	488000	6912182	14.16

Source: Taken from Statistical Yearbook 1977,
 UNESCO, Table 5.1.

(a) Clientelistic Politics¹

Unlike in most Western countries, the articulation in Greece between the State and the various interest groups had a less collective, more personalistic character which can be dated back to the early days of Independence. The linkage between State and society was not in terms of parties representing class interests, but in terms of purely clientelistic networks.

Greek MPs, especially those elected in the countryside, relied heavily on clientelism to secure their election. Since surplus labour that was leaving the villages could not be absorbed into an almost non-existent Greek industry, it was, and is, a commonplace to exchange votes for jobs in the State Bureaucracy.

It was a natural corollary of this that the Greek State bureaucracy, quite early on, achieved a size completely out of proportion to the country's resources and population. It has been calculated by Dertilis,² for example, that in the beginnings of the twentieth century and after standardizing for population size, Greece had seven times more civil servants than the United Kingdom.

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1. For a more general analysis of Greek political clientelism, see K.P. Legg, Politics in Modern Greece. California: Stanford University Press, 1969.
 2. G. Dertilis, "Social Change and Military Intervention in Politics: Greece 1881-1928", unpublished Ph.D. thesis, University of Sheffield, 1976.

Despite its impressive growth, public sector job openings could not keep pace with the insatiable demand for white collar occupations. Some rationing had to take place. In such a situation, it was obvious, that preference would be given to those with the higher educational qualifications.

By providing higher education for his son, therefore, a father maximised the probability that his local MP would secure a job for him in the State bureaucracy. Hence one explanation for the frantic scramble for access to higher education and also an explanation of the high proportion of Greek students coming from the countryside.

(b) The Economic Structure of the Country

The Greek economy never had, and in my opinion never will have a strong industrial sector. It relied on the tertiary sector, particularly shipping and tourism. To many left-wing economists and sociologists this is a typical phenomenon of the exploitation of the so-called "peripheral" countries arising from "the functional necessities of central capital".¹ To right wing orthodox economists, however, this phenomenon is a result of the law of comparative advantage

1. For such a neo-Marxist approach to development see C. Tsoukalas, "Dépendance et reproduction: le rôle de l'appareil scolaire en Grèce dans une formation trans-territoriale", unpublished doctoral dissertation, University of Paris, 1975, and N. Mouzelis, Modern Greece: Facets of Underdevelopment. London: MacMillan, 1978.

which states that each country specialises in the production of those goods and services in which it has a comparative advantage over other countries.

Be that as it may, the fact remains that the tertiary sector was always the backbone of the Greek economy. This has direct effects on educational demand. More so than in other sectors, formal education is of paramount importance in the services, where professional and career outlets and perspectives are to a very large extent a function of the level and quality of education received. The rapid extension of job openings in the tertiary sector has thus a multiplied effect on the demand for education, especially secondary and higher education. Urban migration, due to the lack of an urban proletariat had a higher payoff rate as an investment if it was associated with the attainment of a university degree.

(c) Education as a Means of Limiting Land Fragmentation

As Mouzelis and Attalides have suggested¹, education for at least one son may be partly a means of limiting extreme land fragmentation and of dealing with the need of the daughter's dowry. Especially in regions dominated by family smallholdings, family planning dictated that migration

1. N. Mouzelis and M. Attalides, "Greece", in M. Scotford - Archer and S. Giner (eds.), Contemporary Europe. London: Weidenfeld & Nicolson, 1973.

was the only solution to avoid land fragmentation. Domestic urban migration, as was seen before, had a higher chance of success if coupled with an educational investment. Migration abroad, on the other hand, entailed risks but made no demands on higher educational qualification.

Furthermore, in societies where the dowry system is a rule rather than an exception, the financial success of an educated son could alleviate the burden to the father and also reduce the risk factor associated with the ability of the household in providing the dowry.

(d) The Role of the Diaspora Greeks

The rapid growth of international trade in the Near East in the 18th and 19th centuries was centred, for a number of historical reasons that we cannot enter upon here, around the activities of ethnic minorities among which the Greeks found themselves in a dominant position. Greek communities in places like Alexandria, Smyrna or Odessa, consisted mainly of merchants, agents, lawyers, intermediaries and speculators of all kinds. In 1828, when the Greek State gained its independence, the Greek communities abroad were far more numerous, more urbanised and richer than the communities within the independent state. The rapid expansion of the Greek communities in Eastern Mediterranean, which reached its peak just before World War I, meant that they could not replenish their own ranks

by normal processes of reproduction. This resulted in a large migration flow from mainland Greece, especially from the islands and the countryside.

The spectacular development of the Greek communities abroad had significant retroactive effects on the independent Greek State and especially on educational demand for the following reasons:

- (i) A large flow of money, originating from the diaspora Greeks, poured into the country either in the form of remittances to parents and relatives or as an investment in dwellings. This flow of money strengthened the already expanding tertiary sector of the urban centres and the ability of the State to expand its own bureaucracy, thus, reinforcing further rural-urban migration and educational demand.
- (ii) The hostile reaction of the Ottoman empire against any kind of cultural expansion of its minorities meant a shortage of secondary schools and a complete lack of university institutions. In the communities abroad, diaspora Greeks had to send their children back to mainland Greece, accentuating even further the demand for education.

The decisive contribution of Greek communities abroad towards financing the Greek educational system should have come as no big surprise. Tsoukalas¹ has even calculated

1. C. Tsoukalas, op. cit., Part II, Ch. 2.

that up to 1880, the ten top donations to education by rich Greeks living abroad were in total much higher than the State's entire education budget.

(ii) Educational Planning in Greece: The Practice of Manpower Forecasting

In the 1950's and 1960's and to a lesser extent in the 1970's, the field of educational planning was dominated by manpower forecasting.¹ Most countries, irrespective of size, wealth and level of development, based their plans for educational expansion on long-term forecasts (even up to twenty years) of the requirements for educated manpower.

Greece provided no exception. A typical example of manpower forecasting can be found in the Mediterranean Regional Project², sponsored by OECD, in which the educational requirements were forecast for six Mediterranean countries, including Greece. The methodology used in the project, designed to estimate the educational needs of the Greek economy for the period 1961-1979, was broadly the following:

- (a) The employment and productivity estimates by economic sector, of the existing five year economic plans were projected to 1979.

1. For a good review of the literature in manpower forecasting, see M. Blaug, The Economics of Education. London: Allen Lane, 1970, Ch. 5.

2. OECD, Country Reports: The Mediterranean Regional Project: Greece. Paris, 1965.

- (b) These projections were then converted into forecasts of occupational structure.
- (c) This optimal occupational structure was in turn converted into educational categories "on the basis of the situation existing in 1961 and the general targets of the Greek society".¹

Implicit in the methodology described above are the following assumptions:

- (a) That the planner has perfect foresight in forecasting the future employment, productivity levels, price and wage levels, that is the future state of the economy and the future state of technology as well.
- (b) That the present mix between capital and different labour inputs is the optimum one.
- (c) That every occupation can be precisely defined in terms of the tasks required.
- (d) That the occupational structure of the economy is not going to change during the planning period, that is, an engineer today will be equivalent to an engineer twenty years later.
- (e) That every occupation is associated with a single educational level.

It is hard to lend support to any of these assumptions. Experience has shown that economists have consistently failed in their forecasts of the future levels of

1. Mediterranean Regional Project: Greece, op cit. p. 48.

prices, productivity or employment. Evidence has also been accumulated that there are significant substitution possibilities between

- (i) different years of education
- (ii) different types of education
- (iii) different combinations of education and experience
- (iv) capital and labour
- (v) different labour inputs.¹

The inadequacy of the present occupational classification system requires little elaboration. Moreover, hard evidence has shown that the majority of occupations are associated with a variety of educational levels. To reinforce this very last point, an OECD comparative study conducted ten years ago and comprising 53 countries, demonstrated that an amazing variety of manpower and educational structures was quite compatible with identical levels and rates of growth of GNP and per capita income.²

Apart from the above deficiencies, manpower forecasting does not consider seriously the cost side of the required educational expansion. It seems that educational expansion

1. C.R.S. Dougherty, for example, using a CES production function in his article, "Estimates of Labour Aggregation Functions". Journal of Political Economy, Sept./Oct., 1972, pp. 1101-19, found that the elasticity of substitution between different labour inputs was quite high.

2. OECD, Occupational and Educational Structures of the Labour Force and Levels of Economic Development. Paris, 1970.

has to be achieved at all costs since it is vital for the smooth functioning of the economy.

In summary, as Blaug¹ pointed out:

Manpower forecasting is hardly economics at all but is instead a purely mindless mechanical exercise, involving such patently absurd assumptions as fixed labour output and fixed occupation-education coefficients, as if the economy were a special kind of machine instead of something much more like a biological organism. ²

Manpower forecasts, by consistently pointing to severe shortages of qualified people and by yielding exact numbers of manpower required, had a lot of intuitive appeal. They were particularly welcomed by politicians, especially in countries like Greece with a strong social demand for education, since they legitimised the educational expansion needed for election (or re-election) purposes. For Greece, educational planning according to manpower forecasts or social demand models (that is, models which try to equate the supply with the demand for education) made little practical difference. Both consisted of "wild guesses in an upward direction".³

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1. M. Blaug, "Manpower forecasting as a technique not an approach to planning", Prospects, Winter 1973, pp. 458-463.
 2. Ibid, p. 462.
 3. Ibid, p. 462.

(iii) Private Demand for Education and Educational Planning. The Human Capital Alternatives

The human capital research programme is a relatively new research area of economics which emerged only twenty years ago. Its "hard core" is the notion of human capital. The central idea is that human capacities are in large part acquired or developed through formal and informal education at home and at school and through training, experience and mobility in the labour market. These activities are costly, as they involve direct expenses and earnings or consumption forgone by students, trainees or workers in the process of labour mobility. Since benefits derived from these activities accrue mainly in the future and are for the most part quite durable, the costly acquisition of human capital is an act of investment.

The general categories of human capital investments can be described in a life-cycle chronology. Resources in child care and child development represent pre-school investments in formal school education. Investments in labour market mobility, job choice, job training and work effort occur during the working life, while investments in health and other maintenance activities continue throughout life.

The application of the concept of human capital to education led to the birth of a new subject area, the economics of education. Human capital theory provided a

new alternative (or complement) to the sociological explanations of the demand for education and also furnished a new approach to educational planning, the private and social rate of return respectively.

Human capital theorists argue that the individual's decision to demand education depends on the following factors:

- (a) The individual's expectation of the present value of the future financial benefits he will receive, less the pecuniary costs of education (PV^i),
- (b) the non-pecuniary (or psychic) benefits of being an educated person in relation to the non-pecuniary costs (N^i), and
- (c) the ability of the individual (or the household) to meet the financial costs that education entails (δ^i).

If $(PV^i + N^i) > 0$ the person will wish to be educated. This wish will be translated into effective demand for education if the potential student is able to pay the direct costs. Letting δ^i having the value one if the i th family can obtain financing for direct schooling costs and zero otherwise, the individual demand for education is:

$$\left. \begin{array}{l} D^i = 1 \quad \text{if } \delta^i(PV^i + N^i) > 0 \\ D^i = 0 \quad \text{otherwise} \end{array} \right] \quad (1)$$

and the aggregate demand for education is:

$$D = \sum_i D^i \quad (2)$$

Interpersonal differences in (1) would cause the total demand for education to vary directly with the "objective" private present value of educational investment or, what is the same thing, the rate of return (ROR) to education which simply is the rate of discount which equates the present value to zero.

$$D = g(\text{PV or ROR}) \quad (3)$$

Before proceeding further, the following caveats should be borne in mind:

(1) The responsiveness of the demand for education to the rate of return does not imply that individuals actually compute such returns, but rather, following Friedman¹, that they behave as if they do.²

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1. M. Friedman, "The Methodology of Positive Economics" in his Essays in Positive Economics, Chicago: University of Chicago Press, 1953.
 2. People can be assumed to approximate fairly accurately the intereducational earnings differentials by the differential incomes of their friends and relatives.

(2) That the individual's human capital investment decisions depend on monetary incentives does not imply that monetary incentives necessarily "dominate" decision making. Persons with a strong attachment to certain types of work are likely to choose that work and the associated education even though the economic returns may be relatively low. Moderate changes in salaries in the market will have little impact on the jobs or career choices of these types of people. At the same time, there are likely to be some people who are on the "margin" or with no strong commitment to any single occupation. These individuals will usually change their career (educational) plans as pecuniary incentives change and will move into the areas that provide the greatest gain in income.

(3) The size of the private returns is not the only determinant of the demand for education. Sociological explanations based on historical or institutional factors and on status, prestige and power considerations may be of some importance but they are dominated by the pecuniary (rate of return) factors. We may view sociological factors as determining a minimum value of the demand for education, and high private returns as raising demand above the base. In this sense, human capital and sociological explanations can be better thought as complements rather than substitutes.

In the field of educational planning, after many

years of disillusionment with manpower forecasting¹, human capital theory offered a new investment criterion, the social rate of return. Educational provision is considered as a typical investment project and, therefore, the costs and benefits of this project have to be taken into account. In practice, the benefits of education in rate of return analysis are taken to be the extra before tax payments that typically accrue to people with additional education although the so-called "externalities" of education are not encapsulated in personal income flows. On the cost side, the direct costs of education (in buildings, staff salaries etc.) and the indirect costs of forgone earnings whilst at school or university have to be included.² The yield to an educational investment programme, the social rate of return, does indeed furnish a new social investment criterion: resources are to be allocated to levels of education and to years of schooling so as to equalize the marginal social rate of return on educational investment and, furthermore, this equalised yield on educational investment should not fall below the yield on alternative social or private

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1. A collection of eight case studies in the book by B. Ahamad and M. Blaug (eds.), The Practice of Manpower Forecasting: A Collection of Case Studies. Amsterdam: Elsevier Scientific, 1973, left no doubt that nearly all manpower forecasts were failures when put into the practical test of whether in the event they were proved right.
 2. In the calculation of private returns, benefits are approximated by the after tax intereducational earnings differentials, whilst forgone earnings constitute usually the only private costs, since education is usually publicly provided.

investments. Especially in the decade 1965-1975, calculations of rates of return to education swept the world.¹

Literally hundreds of such studies have been carried out, although in the last 4-5 years the obsession with rates of return seems to have petered out.

Rates of return, especially social rates of return have been consistently criticised since their birth.² The objections that have been advanced fall broadly into the following categories:

(1) In most rate of return analyses, the intereducational earnings differentials are estimated by means of an earnings function, i.e. a regression model in which earnings are explained by a set of independent variables including schooling. Earnings functions suffer from the following econometric problems:

(a) the identification problem. An earnings function is a reduced form equation, encompassing both demand and supply factors. In the absence of estimated parameters of the underlying simultaneous-equation model, there is every reason to suspect that the coefficients of the single

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1. For a good survey of comparative evidence on rates of return, see: G. Psacharopoulos and K. Hinchliffe, Returns to Education: An International Comparison, Amsterdam: Elsevier Scientific, 1973.
 2. See, for example, J. Vaizey, The Economics of Education. London: Faber, 1962 and H.G. Shaffer, "A Critique of the Concept of Human Capital", American Economic Review, September, 1961, pp. 1026-35.

equation are biased.¹

- (b) The problem of multicollinearity among the income determining variables. Education, native ability, socio-economic background, achievement motivation are correlated and it is, therefore, difficult to identify the increment in earnings associated with an increment in education.
- (c) The problem of proxy-variables. The appropriateness of using proxies for various independent variables has also been questioned. Is IQ a satisfactory measure of ability? Is parents' income, education or occupation an appropriate proxy for family background?
- (d) The problem of data sources. With some noticeable exceptions,² all fitted earnings functions have

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- 1. For a discussion of the identification problem in an earnings function, see: F.D. Morgenstern, "Direct and Indirect Effects on Earnings of Schooling and Socio-Economic Background", Review of Economics and Statistics, May, 1973, pp. 225-33. By estimating both a non-recursive single-equation earnings function for the US and a recursive model, he showed that home background exerts weak direct and strong indirect effects on earnings, and this produces a bias in the schooling coefficient of single-equation earnings function.
 - 2. See for example, I. Fägerlind, Formal Education and Adult Earnings. Stockholm: Almqvist and Wicksell International, 1975. In this longitudinal study, 15,000 individuals from Malmo, Sweden, were followed up from the age of 10 in 1938 to the age of 45 in 1971.

made use of cross-section data, despite the fact that the temporal order of variables like native ability, family background, formal schooling, occupational status and personal earnings points to longitudinal data as the most appropriate framework for analysis. Cross-section earnings differentials are then adjusted under alternative assumptions about productivity growth.¹ Researchers have seldom realised that rates of return are very sensitive to different productivity assumptions.² Moreover, it is usually assumed that each educational group shares proportionately in the growth of productivity which legitimately raises additional doubts.

(2) Private rates of return have not adequately dealt with the problems of risk and uncertainty. The rates that motivate students are expected rates of return and there is no reason to think that risk aversion is uniformly distributed among the members of a particular educational

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1. Longitudinal data suffer from the same defect since they implicitly assume that the productivity rates for the past 20 to 30 years are expected to continue in the future.
 2. Leibenstein, for example, found that the rate of return for secondary education for Greece, while standing at 3% under a 0% rate of growth assumption, dramatically jumped to 7% under a 4% growth assumption. (Leibenstein, op. cit., Table 6, p. 13.)

cohort. Thus, even when the means and variances of ex post returns are treated as best estimates of ex ante returns, we cannot predict how students will behave in choosing schooling without taking a view of their attitudes towards risk.¹ In a recent article, B. Eden² showed that rates of return are insufficient statistics for comparing alternative earnings paths. Specifically, he proved that if one income path X has more cumulative variation at the outset and less variation toward the end than another income path, Y, then X dominates Y in the sense that the decision maker prefers X to Y.³ Thus, even if the rate of return to university and secondary education is the same, students may still opt for university provided that the university earnings stream displays more variance in the early years and less in later ones as compared with the secondary school earnings stream.

(3) Implicit in all present value or rate of return calculations is the assumption that the rate of discount, or what is the same thing, the rate of time preference of the individual (or the society) is constant. (i.e. that the

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1. Recent attempts by Y. Weiss in "The Risk Element in Occupational and Educational Choices", J. Polit. Economy, Nov./Dec. 1972, pp. 1203-13, supposed to show that risk differentials among individuals are not very important have raised more questions than they were supposed to answer. For a critical comment, see: J. Hause, "The Risk Element in Occupational and Educational Choices: Comment", J. Polit. Economy, July/August, 1974, pp. 803-8.
 2. B. Eden, "Stochastic Dominance in Human Capital", J. Polit. Economy, February, 1980, pp. 135-145.
 3. The intuitive reasoning is that a decision maker with income path X can, by engaging in a fair gamble, create the random variation of the cumulative income under Y and still have the advantage that more of the uncertainty is resolved at an earlier age.

rate at which we discount 2000's and 1990's pounds to make them equivalent to today's, is the same).

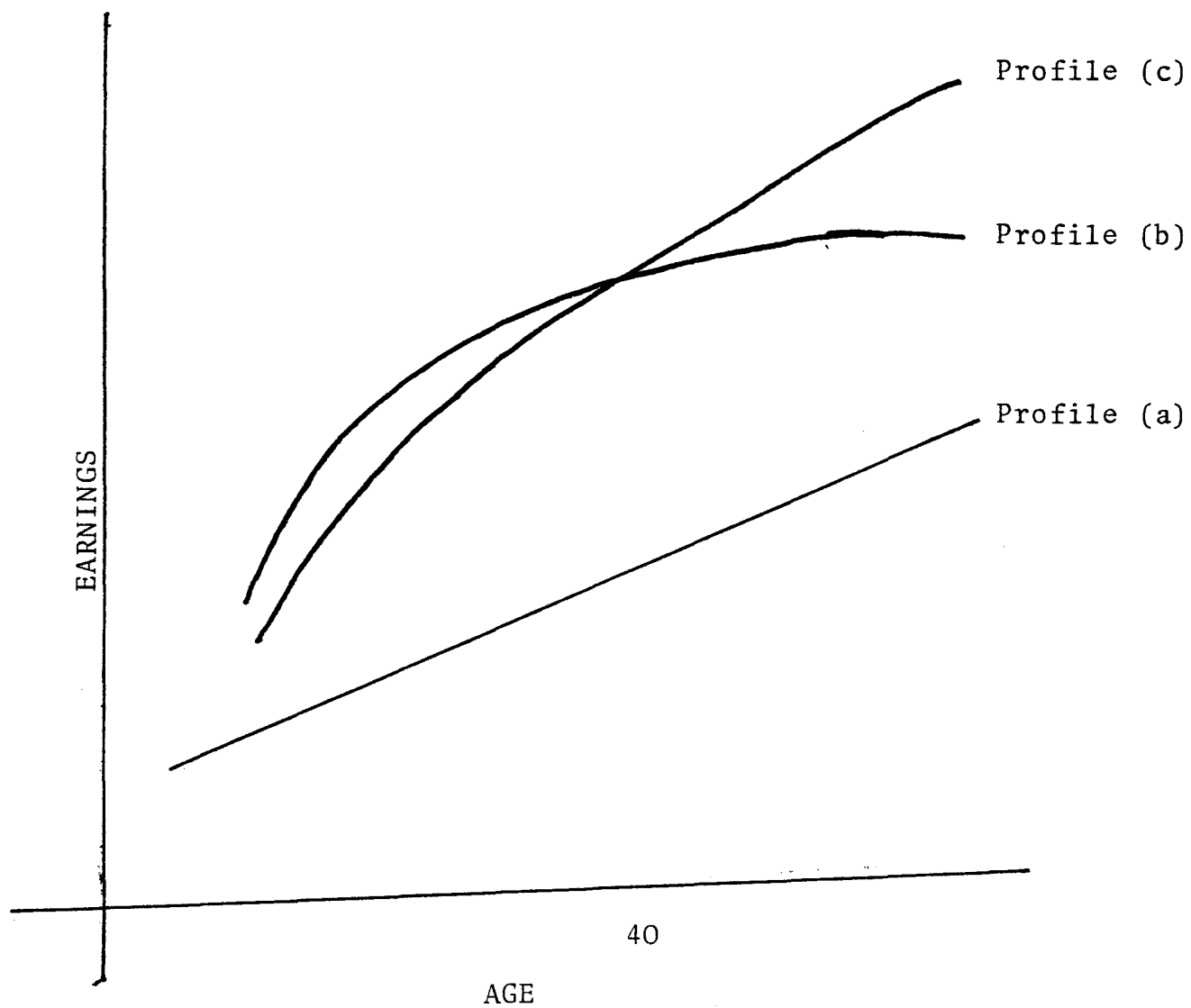
From the individual's viewpoint, in a static utility maximising framework, this might be considered to be a fair assumption, although, in a dynamic utility maximising context, the non-constancy of the rate of time preference has long been recognised by Böhm-Bawerk¹ and Marshall² but has been more explicitly treated by Strotz.³

Even in a static framework, however, the constant rate of time preference assumption is valid if, and only if, two further conditions are met.

(A) Assume that two earnings streams represented with profiles (b) and (c) are associated with the same rate of return over profile (a). ((b) and (c) can be thought of as the earnings profiles associated with two different fields in higher education and (a) as the profile for secondary education.) The three profiles are portrayed graphically in Figure 1. Profile (c) offers more earnings after the age of 40 and less before that age as compared with profile (b).

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1. Böhm-Bawerk, The Positive Theory of Capital (trans. by W. Smart). London: G.E. Stechert & Co., 1891, pp. 257-258.
 2. A. Marshall, Principles of Economics (8th edn.). London: Macmillan, 1920, p. 120.
 3. R. Strotz, "Myopia and Inconsistency in Dynamic Utility Maximization", Review of Economic Studies, No. 61, 1955-56, pp. 165-185.

Figure 1
AGE-EARNINGS PROFILES FOR TWO DIFFERENT KINDS OF
HIGHER EDUCATION WITH THE SAME RATE OF RETURN



Suppose, furthermore, that the individual is expecting to incur heavy expenses for his children's education after the age of 40 and that he would prefer, therefore, the earnings stream that profile (c) entails. The equal rate of return associated with the two profiles, however, implies that the individual is indifferent to the choice posed by them. That is, even if he likes profile (c), since it is associated with higher earnings after the age of 40, he is equally attracted by profile (b), since he can save out of the higher earnings before 40 that (b) entails and spend these savings later, when his higher financial requirements arise.

If, however, the individual is afraid of his financial extravagance and thinks that by choosing profile (b) he will not keep to his intention of saving part of the higher income before the age of 40, he may well choose profile (c) in order to avoid potential temptation. His action can be described as a precommitment strategy. Preference for (c) rather than (b) implies in effect, that the individual, in order to secure his desired ex ante allocation of consumption, attaches higher weight to the later than the earlier years in the discounting process. By doing that, the present value of profile (c) becomes greater than that of (b), although they are equal under the constant

rate of time preference assumption. Thus, if the individual is uncertain about his future consistency, he may opt for a precommitment strategy which challenges the constant rate of time preference assumption.

(B) The assumption of constant rate of time preference implies that people are in general consistent planners. Consistency in planning is a characteristic that people do not inherit by birth but acquire through education at home and at schools. (I remember that I wrote at least half a dozen essays in school about the virtues of frugality.) The acquisition of a constant rate of discount in turn implies that low-income groups with little education or training may exhibit inconsistent or imprudent planning by sharply discounting the future.¹

It is seen, therefore, that the assumption of constant rate of time preference requires that, on average, people: (a) do not adopt precommitment strategies and (b) have learnt the virtues of frugality, i.e. they have learnt to plan consistently.

(4) The use of earnings data usually drawn from aggregate sources does not take into account the so-called "moonlighting" income, which is of paramount importance especially in LDCs. Is "moonlighting" more widespread among the

1. The incidence of sharp discounting of the future by "primitive races, children and other uninstrusive groups in society" was clearly asserted by I. Fisher, The Theory of Interest. London: Macmillan, 1930, ch. IV, § 9, and earlier by Böhm-Bawerk, op. cit., p. 246.

more or less educated people ? Unless we assume that all educational groups equally share in moonlighting, rate of return calculations based on declared incomes will undoubtedly be biased in either direction.

(5) Rates of return are not useful for normative purposes or even as a basis for positive description because there are significant market failures on both the cost and revenue side of education, whose effects, because of their essential character, cannot be eliminated from the data. In measuring the benefits of education, the existence of externalities is more easily recognised than estimated. There may be positive external production effects from education if, for example, it helps to create a scientific environment conducive to more successful research and development activities. On the other hand, there may be public disutilities associated with education. The recent phenomenon of educated unemployed has been seen to create major social problems. It has also been recognised that education involves consumption externalities as well. The benefits of education in making better neighbours and citizens are examples of such effects. Education might also enhance the non-pecuniary attractions of certain occupations. Since the effects of externalities are not transmitted through markets, estimation of their significance is not possible by traditional means.

The usual response to this criticism has been that if the external benefits of education are assumed to be

positive, the private rates of return can still provide a lower bound to the social rates of return. Even if we grant the point that the external effects of education are positive, failure to include the direct costs of education in the private calculus (which is the case when education is publicly provided) will necessarily result in private returns being higher than social returns. To the extent that the divergence between the two rates of return is large enough, the social rate ceases to be a practical social investment criterion, since the supply of education (which is determined by the politicians) is a function of the private returns. The social rate of return is a potentially useful investment criterion when and only when the private and social returns are of broadly similar magnitudes.¹

(iv) Education, Screening and Internal Labour Markets

The most devastating criticism of rates of return has, however, come from the proponents of the so-called

1. For a further discussion of the political constraint in educational planning, see: G. Fields, "The Allocation of Resources to Education in Less Developed Countries", Journal of Public Economics, February, 1974, pp. 133 - 143.

screening hypothesis¹ (for which the terms signalling hypothesis or simply credentialism are also used in the jargon), which basically challenges the view that earnings differentials, standardised for differences due to other factors, measure the social returns to education. The basic ingredients of the screening hypothesis are the following:

- (a) Employers prefer more than less educated workers not because they possess cognitive skills but because they possess certain personality traits like ability, achievement drive, self-reliance or compliance with organisational rules.²

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1. The most prominent expositions of the "screening hypothesis" can be found in (a) E.S. Phelps, "The Statistical Theory of Racism and Sexism", Amer. Econ Review, Sept, 1972, pp. 619-61; (b) K.J. Arrow "Higher Education as a Filter", Journal of Public Economics, July 1973, pp. 193-216; (c) D. Starett, "Social Institutions and the Distribution of Income: A Neo-classical Defence of Radical Positions", Institute for Mathematical Studies in the Social Sciences, Technical Report 117, Stanford University, December 1973; (d) M. Rothchild, "Models of Market Organisation with Imperfect Information: A Survey", Journal of Political Economy, Nov./Dec, 1973, pp. 1283-1308; (e) P.J. Taubman and T. Wales, in Higher Education and Earnings: College as an Investment and Screening Device. New York: McGraw-Hill, 1974; (f) L.C. Thurow, "Measuring the Economic Benefits of Education", in M.S. Gordon (ed.), Higher Education and the Labor Market. New York: McGraw-Hill, 1974, pp. 373-418; (g) M. Spence, Market Signalling, Cambridge: Harvard University Press, 1974; (h) P. Wiles, "The Correlation Between Education and Earnings: The-External-Test-Not-Content-Hypothesis (ETNC)", Higher Education, February, 1974, pp. 43-58; (i) J.E. Stiglitz, "The Theory of "Screening", Education and the Distribution of Income", American Economic Review, June, 1975, pp. 283-300; (j) K.I. Wolpin, "Education and Screening", American Economic Review, December, 1977, pp. 949-958.
 2. It is interesting to note that signalling models make no attempt to identify the precise nature of these characteristics.

- (b) These desirable attributes cannot be known with certainty at the time of hiring and the employer faced with a selection problem is tempted to treat educational qualifications¹ as a "screening" device to sort out new workers in terms of those attributes. Of course after some period of observation of a worker's performance, employers are able to measure more or less accurately his productivity. The discrete time-lag involved in learning an individual's productive capabilities makes the hiring decision an investment under uncertainty.
- (c) Cognitive skills are acquired by on-the-job training and employers are, therefore, concerned with selecting job applicants in terms of their trainability. Potential trainability is directly related to possession of those personality traits for which educational qualifications serve as a proxy. Education and training costs are, therefore, inversely related.

1. It should be kept in mind that education is not the only screening device that employers may use. At the time of hiring, employers are able to observe a variety of personal data such as age, race, sex, education and test scores. Spence calls those traits that the worker cannot alter, like race or sex, "indices", while those that are alterable, like education, "signals". It is interesting to note that in the first exposition of the signalling hypothesis by Phelps, race and sex were considered as "screening" devices. Subsequently, the analysis was easily extended to take into account educational qualifications.

The question, therefore, arises whether formal education is the most efficient selection mechanism that can sort out individuals in terms of their trainability. This weak version of the screening hypothesis expounded above runs into the serious difficulty that it accounts at best for starting salaries and not for the earnings of long-time employees in different firms. An employer has every opportunity with long-term employees to acquire independent evidence of job performance without continuing to rely on educational qualifications. Yet the correlation between earnings and length of schooling actually increases in the first 10-15 years of work experience,¹ a fact difficult to explain by this version of the screening hypothesis. In another interesting test of the screening hypothesis, Wolpin² found that self-employed workers in non-professional occupations obtained about the same level of schooling as non-professional salaried workers. Since self-employed workers have less incentive to acquire the educational "signal" than salaried employees, Wolpin concluded that his evidence could not lend support to a predominant screening interpretation.

A stronger version of "screening", however, surmounts these difficulties by assuming that firms operate

1. For a report of such a finding, see R. Layard and G. Psacharopoulos, "The Screening Hypothesis and the Returns to Education", Journal of Political Economy, Sep/Oct, 1974, pp. 985-998.

2. K. Wolpin, op. cit.

their own hierarchically organised and departmentally based "internal labour markets". The principal function of these hierarchically organised structures, as will be seen in subsequent chapters, is :

- (a) to maintain output in the face of unpredictable variations in demand,¹ and
- (b) to ensure stability and control over input markets, including labour.

As a consequence of (a), departments operate with enough manpower slack to ensure every new recruit a well defined sequence of promotions throughout his working life. As a result of (b), increasing emphasis on stability implies that maintenance and control of work effort and loyalty assume paramount importance in personnel policies. Abuse of seniority provisions and external recruitment seems to interfere with the pursuit of these aims. Statistical discrimination based on educational qualifications (but also on sex or race) at the "entry ports" of hierarchical structures may well have durable effects. A less educated worker, although potentially more able than an educated one, may not have the opportunity to catch up in the rigid promotion ladder governed almost exclusively by seniority provisions. The loss of one grade at the hiring point may well

1. This argument has been advanced by V.L. Rawlings and L. Ulman, in "The Utilization of College-Trained Manpower in the United States", in M.S. Gordon (ed.), Higher Education and the Labor Market. New York: McGraw-Hill, 1974, pp. 198-236.

have irreversible effects inside "internal labour markets".

The theory of screening, especially in its stronger version, appears to have radical implication for educational policy. Suppose that there are two levels of schooling, university and high school and that university graduates are not perfect substitutes for high school graduates. An educational expansion of higher education is unlikely to have much impact on earnings differentials because an increased flow of university graduates will simply promote upgrading of hiring standards: college graduates will be worse off in absolute terms but so will high school graduates, and hence earnings differentials by education will remain more or less the same. What the theory of credentialism amounts to is that the use of intereducational earnings differentials in the calculation of the social return to education is unwarranted. The social rate of return to educational investment is a rate of return to a particular occupational selection mechanism. If university graduates are not perfect substitutes for high school graduates, the social rate of return may indeed be positive. Following Thurow,¹ therefore, instead of blindly calculating rates of return based on intereducational earnings differentials, the following questions have to be answered:

1. Thurow, op. cit.

- (1) Who bears the training costs - the employer or the employee?
- (2) What set of background characteristics did the individual have prior to improving his education and what set of background characteristics does the individual possess after improvements in his education ?
- (3) What is the elasticity of training costs with respect to increases in education across the lifetime-income ladders ?

Unfortunately no human capital theorist has been able to quantify the incidence of training, estimate its cost, or even explore the relationship between training and job design.¹ While the screening hypothesis concentrates its fire on the social rate of return to education, the private rate of return is left intact as an explanation for the demand for education. Signalling models do not conflict with the fundamental notion of human capital - of forgoing current income for increased future earnings. Screening by employers in terms of educational qualifications creates the incentive on the part of employees to produce the "signal" that maximizes the probability of being selected, and this signalling incentive is in fact conveyed by the

1. The only attempt directed to tackle the much neglected topic of job design can be found in J. Scoville, Manpower and Occupational Analysis: Concepts and Measurements. Lexington, Mass.: Heath, 1972.

private rate of return to educational investment.

The screening hypothesis, by drawing attention to the demand side of the labour market and the human capital theory by concentrating on the supply side can be better thought as complements rather than substitutes. The real difference between them is whether private rates of return are totally at variance with social rate of return.

In all likelihood, as Blaug¹ has pointed out,

Human capital theory and credentialism will be swallowed up in a new, more comprehensive theory of the labour market in which employers and employees select each other when their attributes matter but when information about these attributes is subject to uncertainty. 2

(v) The Objectives of this Thesis

After this brief discussion of the outstanding issues in human capital theory, the objectives of the present thesis have to be expounded.

The research undertaken consists of three essays in human capital theory using data that have been collected from Greece.

Chapter (2) undertakes the estimation of the

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1. M. Blaug, "The Empirical Status of Human Capital Theory: A Slightly Jaundiced Survey", Journal of Econ. Literature, September, 1976, pp. 827-855.
 2. Ibid., p. 850.

private rate of return to university education in the Banking and the Civil Service sectors of Greece, which traditionally employ the bulk of Greek university graduates. It is seen that State legislation allows people to reap even infinite returns to their educational investment, providing thus a strictly economic explanation of the phenomenon of the "overeducated" Greek and of the disproportionately large migrating flows from the countryside to the Greek capital throughout the twentieth century. The incidence of exceptionally large private rates of return to university education and the implied divergence between private and social returns raises some doubts about the potential use of the social rate of return as a social investment criterion. Since the supply of education in democratically elected governments varies directly with the demand and hence the private returns to education, the signals conveyed by the social returns are unlikely to have any practical significance in educational planning.

In Chapter (3), the concept of the "internal labour market" (ILM), which has already been mentioned in relation with the screening hypothesis, is discussed and its relationship with human capital theory (or neoclassical economic theory) is elucidated. It is seen, that the real difference between human capital theory and ILM theory lies in the neglect by the former of the organisational imperatives of firms of a usually large size. Furthermore, some criteria necessary for identifying the existence of ILMs

are established and applied to a four-company sample of Greek white collar employees. Lastly, the implications of (a) strong ILMs and (b) the use of education as a screening device by employers on educational demand is explored. In one of the models presented, it is shown that an increase in the supply of highly educated people does not necessarily lead to a reduction of the demand for higher education.

Chapter (4) is devoted to sex discrimination and in particular to discrimination inside hierarchically organised ILMs. It distinguishes between the various theories of discrimination and in particular the labour supply (or human capital) and the demand based statistical theories of discrimination. It is shown that statistical theories of sex discrimination are the exact counterpart of screening by employers in terms of educational qualifications. In the context of ILMs early statistical discrimination by education or sex can have irreversible effects in the wage determination process.

Furthermore, the importance of marriage and children variables in sex discrimination is analyzed and finally the two leading theories of sex discrimination (i.e. labour supply and statistical discrimination theories) are put into an empirical test using a three company sample of white collar employees. It was found that the data were not consistent with the predictions of the labour supply hypothesis. On the other hand, a version of statistical discrimination could not be refuted by the evidence.

The rejection of some of the predictions of the supply based human capital theory of sex discrimination does not necessarily imply that it should be dismissed outright. As in the case of education it may well be that the human capital theories and the statistical theories of sex discrimination are indeed complementary.

CHAPTER 2

PRIVATE RATES OF RETURN TO UNIVERSITY EDUCATION IN THE GREEK BANKING AND CIVIL SERVICE SECTORS

Private demand for higher education is determined by a combination of social and economic factors (although social factors are not usually devoid of economic content). It is the object of this essay to set aside the social or institutional interpretations developed in the introductory chapter and concentrate on whether pay differentials on their own are capable of providing a satisfactory explanation of the ever-growing demand for university education in Greece.

Private rates of return to university education are computed separately for the Banking Sector and the Civil Service in Greece.¹ Since both the Banking and the Public Sector in Greece are significant employers of labour with secondary or university education, it is reasonable to assume that earnings within these sectors provide one of the signals influencing the private demand for education.²

Section 1 elucidates the problem of who is the decision making unit in the educational investment process.

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1. There are over 75,000 people employed in the Banking Sector and over 300,000 employed in the Civil Service (including teachers, employees in public corporations, etc.).
 2. For another effort to calculate rates of return for the Public Sector in Iran, see G. Psacharopoulos and G. Williams, "Public Sector Earnings and Educational Planning", International Labour Review, July, 1973, pp. 43-52.

Section (2) provides a rationale for the disaggregated rates of return approach undertaken in this study. Sections (3) and (4) present the earnings functions analysis for the Banking Sector and the Public Sector respectively. Section (5) presents and discusses the rate of return results. Section (6) discusses some policy implications, whilst Section (7) presents the conclusions.

(1) Private Investment in Education: Household, Parental or Student Decision ?

It is widely accepted that people invest in education for the financial benefits that it confers. But is this an investment undertaken by the households, the parents or the students ?

A. Human capital theorists have assumed that households maximize a utility function, thereby regarding households as the basic decision unit. Becker's important article, for example, on the "Theory of the Allocation of Time",¹ is concerned with the production of utilities by households. Schultz² has long been inclined to look at households and the 1973 and 1974 J.P.E. Supplements dealing with family

1. G. Becker, "A Theory of the Allocation of Time", Economic Journal, September, 1965, pp. 493-517.

2. Schultz, T.W., Investment in Human Capital. New York: Free Press, 1971.

investment in children and with "Marriage, Family, Human Capital and Fertility" have further advanced this view.

If it is a household decision, then a model of household saving and investment decisions is most appropriate. Such a model would start out with households maximizing a multi-period utility function, similar to the traditional economic theory of household investment in durable capital goods or in a home, and subject to appropriate multi-period budget and time constraints. It could develop the interdependence with the family's investment in health, with instalment credit and mortgage financing, and with parents' saving over their life cycle as they plan toward retirement.

There are several possible assumptions in a family saving and investment decision model with respect to the degree of homogeneity within the household. It may not be too bad an approximation to assume that the tastes of the parents and the student are homogenous and that the family budget constraint is relevant.¹ A good part of the psychological stock of tastes and habits held by the younger family members are likely to be acquired from within the home environment over many years. An alternative possibility is to assume that the utility function is that

1. Research in the United States has shown that the choice made by the prospective freshman to enter and finance a college education is more likely to be a family decision and the selection later of a major field is more likely to be independent.

possessed by the head of the household who has previously taken the tastes of the prospective student and other family members into account. In either event, the parents' aspirations for the son or daughter are relevant and the family budget restraint which includes the income and assets of the prospective student applies.¹

B. If, on the other hand, the decision is made independently by the student as he contemplates his own future, especially now that the voting age in most countries has been lowered to 18, an independent student model is more appropriate. In this event, the parents' income and assets are also relevant but with a different significance. In this case attention is likely also to be given to student borrowing. In the independent student decision model, if the parents are assumed to provide financial support during the years of study, the difference between forgone earnings and the income provided by the parents has to be included on the cost side.² In the calculation of rates of return, earlier years take a much heavier weight in the discounting process. One should, therefore, expect that rates of return

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1. A third possibility (that of a collective family indifference curve and allocations within the family) is considered by P. Samuelson in the article, "Social Indifference Curves", Quarterly Journal of Economics, February, 1956, pp. 1-22.
 2. Direct private costs of schooling are usually negligible since in most countries education is publicly provided.

calculated for the student as the decision-making unit will be much higher than rates of return calculated for the household for the very reason that earnings forgone in the former case will be much less than in the latter.¹

C. In this part, the possibility of an independent parental investment decision will be explored. It will be shown that, especially in the case of less developed countries (LDCs), it is perfectly rational to consider parents independently as investors and compute a separate rate of return to their investment decision.

Suppose that an Indian father decides on whether to send his son to an institution of higher education. What are the costs and benefits that confront him? On the cost side, he has to pay for tuition fees (if there are any), books, travel expenses, etc., plus food, clothes and all other expenses that accrue while the child is studying and staying with the family. On the benefit side, there are non-pecuniary and pecuniary benefits. On the non-pecuniary side he enjoys the recognition of society of being a model parent, willing to sacrifice his own well-being for the advancement of his children. But more importantly, by providing higher education to his children and consequently

1. In the independent student model, even if students are assumed to subsidize their parents' pension after retirement, the reduction in disposable income that this will entail is unlikely to affect rates of return since later years receive a much lower weight in the discounting process.

increasing their earning capabilities, he simultaneously maximizes their ability to help him financially in the later periods of his life, especially after retirement.¹ This incentive will be stronger in LDC countries lacking comprehensive pension schemes. But even if pension schemes exist, the amount of money they offer is usually low and further support is needed. The parents' investment decision is portrayed in Figure 1.

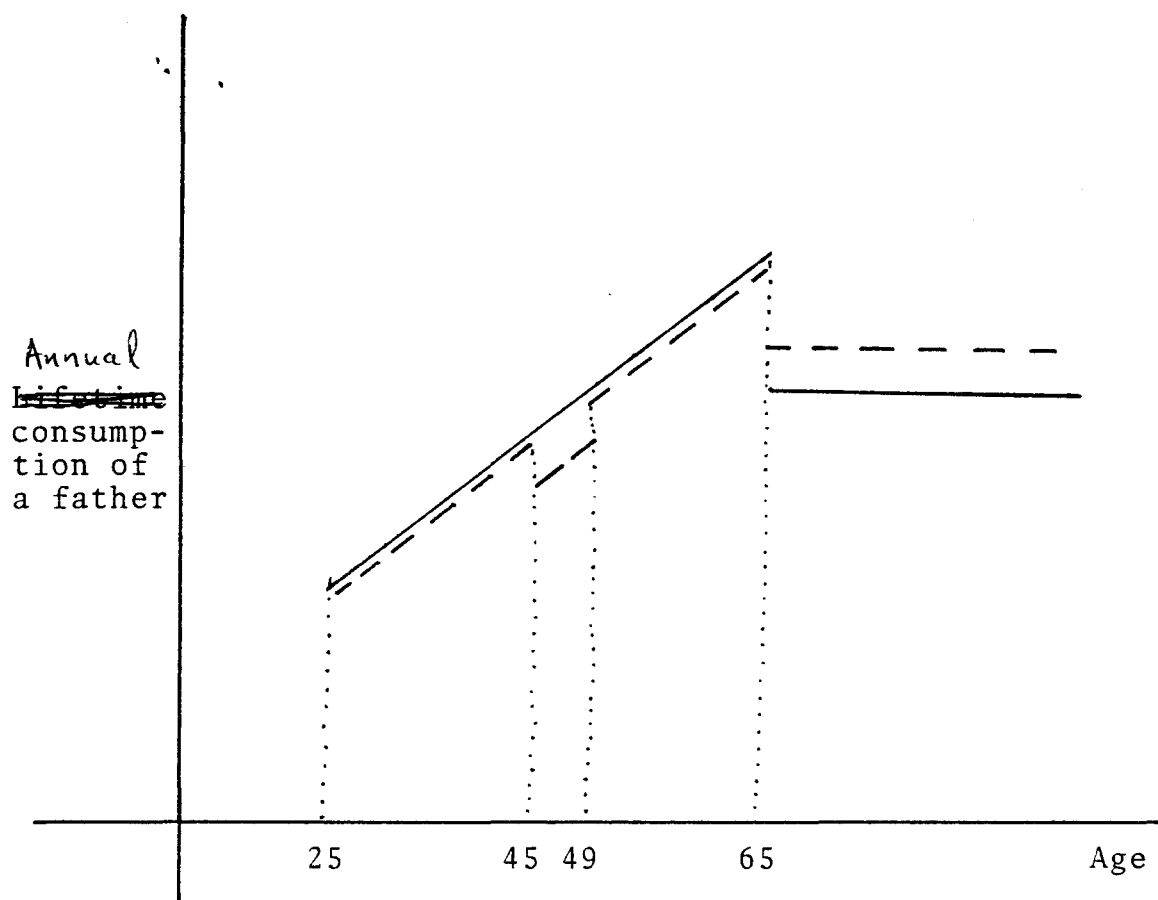
The father is assumed

- (a) to start work at 25 and be employed for a 40-year period until 65;
- (b) his consumption equals his income (i.e. no savings are assumed);
- (c) his consumption profile is depicted to be monotonically increasing until retirement, when he receives a flat pension rate.

Suppose that the father reaches the age of 45 and contemplates whether or not to send his son to university. What are his options ? He can either choose consumption profile A and refuse to incur the costs of education (but

1. This explanation is quite similar to some recent economic theories of fertility. According to these theories, in many underdeveloped, poverty-stricken countries, the phenomenon of high fertility rates is explained as a sound investment decision by the parents. The more children they produce (especially sons), the higher the probability that one or more of the children will succeed later on in his life and the likelier it becomes that he (or she) will be able to support them in the last stages of their life.

Figure 2

ALTERNATIVE PARENTAL LIFETIME CONSUMPTION PROFILESNotes:

The continuous line depicts consumption profile A.

The dashed line depicts consumption profile B.

simultaneously accept a lower consumption profile after retirement) or profile B with less consumption between, say, 45 and 49, but with higher consumption after retirement (since he expects his child to subsidize his pension).

In mathematical notation:

$$\begin{aligned} \text{Present Value for Profile A} &= \sum_{t=1}^{20} \frac{w_t}{(1+r)^t} + \sum_{t=21}^{35} \frac{p}{(1+r)^t} \\ \text{Present Value for Profile B} &= \sum_{t=1}^4 \frac{w_t - C}{(1+r)^t} + \sum_{t=5}^{20} \frac{w_t}{(1+r)^t} \\ &\quad + \sum_{t=21}^{35} \frac{p+H}{(1+r)^t} \end{aligned} \quad 1$$

where w = wage at time t

p = pension rate

C = the costs that the father incurs over the four-year period when he pays for his child's education

H = the additional income he expects after retirement

r = rate of interest (or rate of time preference)

If $B > A$, it is rational for the father to undertake the

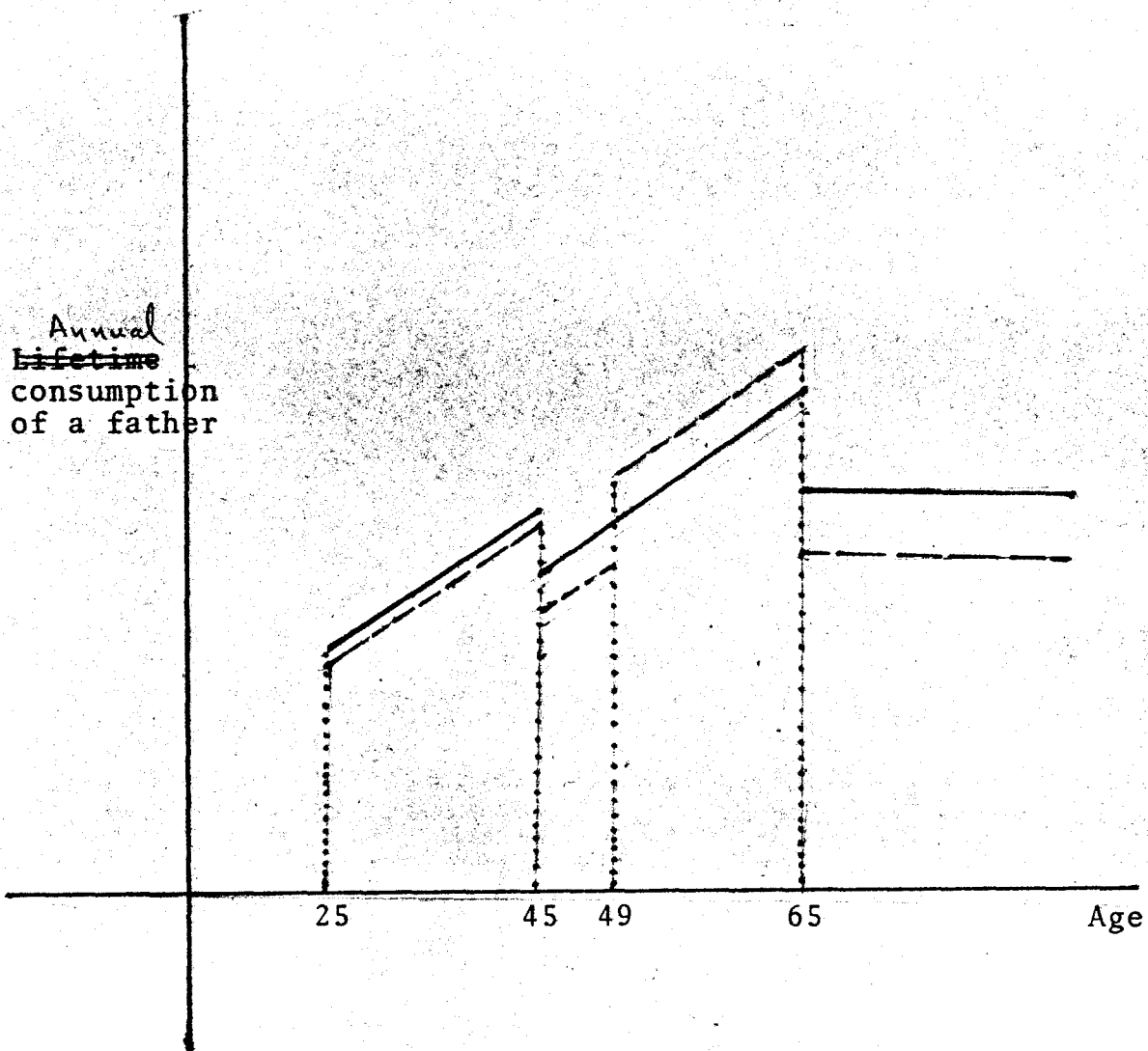
1. At retirement the father expects to live for another 15 years.

educational investment.

But even if, ideally, a researcher had collected all the data necessary to compute the two present values, it would be hard to prove that profile B is preferable to A.¹ The difficulty arises because in rate of return calculations, the individual is assumed to have a constant rate of time preference throughout his lifetime. Earlier years take a much heavier weight than later years in the discounting process and it is, therefore, unlikely that additional income after retirement will outweigh income forgone at present. Moreover, in this model, the parents are assumed to be certain about the willingness of their children to provide financial support in old age.

Under the constant rate of time preference assumption one should generally expect negative rates of return to the parents' investment decision. But if the time preference rate at the age of 65 is much higher than the corresponding rate at 45 (which is very likely, especially in countries with non-existent pension schemes),² the provision of education might prove to be a perfectly rational economic decision. Profiles A and B, portrayed in Figure 1, do not exhaust the parents' options. As can be seen in Figure 2, the parents also have the option of profile C, by which parents can save, say, between 45 and 65

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1. For example, a survey can be conducted among old pensioners to find out the extent of financial support that their children provide.
 2. In this case one can think of an infinite rate of time preference at retirement age.

Figure 3ALTERNATIVE PARENTAL LIFETIME CONSUMPTION PROFILESNotes:

The dashed line depicts profile B

The continuous line depicts profile C.

(or, alternatively, during their whole working life) and consume these savings after retirement.¹

So if the parents are assumed to invest in their children's education solely for the reason of financial support at old age, we distinguished three possible options portrayed by profiles A, B and C. In profile A the parents consume everything they earn, in profile B they forgo present consumption only during the years of the children's studies in order to receive financial help after retirement and in profile C they save during some or all of their working life to consume more at old age. (Options B and C are, of course, not mutually exclusive).

In principle, therefore, the parents should be able to assess the costs and benefits of profiles A, B or C or any other possible combination of investment (savings) decisions. As pointed out before, comparison of profiles A and B would result in a negative rate of return. Comparison between B and C, though, does not lead to any similar a priori predictions.

The object of this section was to underline the fact that there can be 3 rates of return to investment in education corresponding to the household, the parents or the student as the decision unit. The rates of return that are

1. Profile C would correspond to the life-cycle consumption/saving theories first expounded by F. Ando and F. Modigliani, "The Life-Cycle Hypothesis of Saving: Aggregate Implications and Tests", American Economic Review, March, 1963, pp. 55-89.

computed in this study assume that the household is the decision making unit and, therefore, include the full earnings forgone on the cost side. It should be kept in mind that these rates of return are lower than the ones calculated for the individual student as the decision unit.

(2) Occupationally Disaggregated Rates of Return to Education

(a) The Rationale of Occupation Disaggregation

The first attempts to estimate the private rates of return to education, treated as if they were an investment, were made on a highly aggregate basis. All occupations were combined with distinction made among individuals at each level of education only by categories of race and sex.

But although rates of return, as conventionally calculated, may, for example, show high returns to university education, they are not able to distinguish between, say, high rates of return to mechanical engineering and low rates of return to liberal arts degrees.

In considering the returns to an educational investment one must first estimate the earnings differential between those persons who would undertake the additional education and those who would remain at the educational

level from which the first group advances. Ideally, therefore, one should compare the two groups of individuals with approximately the same ability and socio-economic background, in order to arrive at meaningful rates of return.

Occupational disaggregation helps in defining groups of individuals with relatively homogenous personal characteristics of intelligence, physical aptitude and personality and to isolate the effects of education on income. On the other hand, although occupations have different ranges of requirements for physical and mental capabilities and personality attributes, these ranges overlap among occupations. Moreover, individuals may typically possess a range of these attributes which make them potentially useful for a variety of occupations as the existence of interoccupational mobility suggests. These considerations qualify the assumption that each occupation is characterized by a unique distribution of personal qualities. Even so, it is more informative with respect to the effects of education alone to compare the incomes of electrical engineers with varying levels of education than to simply compare the income profiles of all persons with, say, a high school and college education. Occupational disaggregation also helps to achieve homogeneity in the socio-economic backgrounds of the labour forces that are being compared. Since there seems to be a certain degree of social immobility among occupations, occupational disaggregation provides, to a limited degree, a means of

standardizing for these influences.

In order to achieve the greatest possible degree of homogeneity, therefore, the alternative age-income profile for the lower level of education has to be taken from the occupation itself. For occupations in which an age-income profile associated with lower levels of education cannot be estimated, an alternative has to be chosen from an occupation that appears to be comparable in terms of the level of physical and mental attributes that characterize the first occupation.

An example of the latter can be found in a study by Davis¹ when he tries to estimate the rate of return to medical education in Australia. In this particular study, the age-income profiles for doctors were compared with those for bank employees who were assumed to obtain promotion at the minimum possible age in order to equate their ability with the presumed natural ability of the medical students.

The first attempt to compute returns to education in an occupationally disaggregated framework was made by B. Wilkinson.² He calculated the discounted present value to different levels of education for six different occupational categories, namely, Labourers, Carpenters,

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1. Davis, D., "Manpower Planning, Rate-of-Return Analysis and the University Medical Schools: The Case of Australia", Higher Education, November, 1977, pp. 301-311.
 2. B. Wilkinson, "Present Values of Lifetime Earnings for Different Occupations", Journal of Political Economy, December, 1966, pp. 556-73.

Compositors and Typesetters, Draftsmen, Science and Engineering Technicians and Engineers. R. Eckhaus¹ in 1973 computed rates of return to 70 different occupational categories while P. Taubman and T. Wales² in 1974 repeated the exercise using only seven broad categories, namely, Professional, Technical, Sales, Blue Collar, Service, White Collar and Owner Manager.

Proponents of the occupationally disaggregated approach accept that even in this framework, a wide range of individual attributes other than education can influence the results. Nonetheless, they think that a greater degree of standardization is achieved by these means than by comparing the age-income profiles associated with different levels of education for the entire labour force.

(b) The Basic Criticism Levelled Against the
Occupationally Disaggregated Approach

Various scholars of the human capital tradition have argued that the existence of occupational labour mobility not only justifies but even necessitates an aggregate approach to the estimation of education income relations. Sceptical arguments with respect to occupational

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1. R. Eckhaus, Estimating the Returns to Education: A Disaggregated Approach. New York: McGraw-Hill, 1973.
 2. P. Taubman and T. Wales, Higher Education and Earnings: College as an Investment and a Screening Device. New York: McGraw-Hill, 1974.

disaggregation have been made since the birth of the human capital approach. Becker has written:

... education has little direct effects on earnings; it operates primarily indirectly through the effect on knowledge and skills. Consequently, by standardizing for enough measures of knowledge and skill, such as an occupation or ability to communicate, one can eliminate the entire true effect of education and earnings. 1.

It is not clear what Becker means by saying that an occupation is a "measure of knowledge of skill".

Hanoch's² argument on the futility of occupational comparisons is more clear:

...an individual who completed more years in school would expect to move upward in the occupational scale and, perhaps, to work in a better industry. This is, in fact, a main channel by which he can realise some returns on the additional investment in schooling. If he were to be restricted to staying in the same occupation-group or industry, he would be much more limited in the opportunities to increase his income. 3

According to this argument, interoccupational mobility is an important instrument for the realization of the returns to education. Occupationally disaggregated rates of return tend, therefore, to underestimate the

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1. G. Becker, Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education. New York: National Bureau of Economic Research, 1964, p. 86.
 2. G. Hanoch, "An Economic Analysis of Earnings and Schooling", Journal of Human Resources, Summer, 1967, pp. 312-320.
 3. Ibid., p. 312.

returns to education.

(c) A "Job Family" Disaggregated Approach ?

Following the work of J. Dunlop, James Scoville in the late 'sixties and early 'seventies attacked the much neglected topic of job content. Scoville conceived the job content to have two main dimensions:

- (a) the job family; and
- (b) the level of job content.

In Scoville's words:

A job family is defined by the material, equipment or function about which the jobs in it are centred. It determines the focus of the job. Jobs with similar focus will be grouped into job families by this major focus. ... The content-level breakdown will relate to all the factors which affect the complexity of the job. As has long been recognised, the narrow concept of skills is inadequate to describe the content of most jobs. The level of content depends not only on manual dexterity, but on the mental function, as well as responsibility and coordinating duties. In accordance with the relative range of duties, skills and abilities involved, jobs should be ranked within the job families, just as they are ranked in actual job evaluation systems. Such a twofold breakdown will indicate for the whole economy the major technical foci of jobs as well as the relative levels of job content. ¹

Within the blue-collar occupation, Scoville identified four job families which focus on tools, machines, the operation of vehicles and inspection and supervision. Within white-collar and service jobs the following families

1. J. Scoville, The Job Content of the U.S. Economy, 1940-1970. New York: McGraw Hill, 1969, pp. 12-13.

were identified: Sales, clerical, personal services, entertainment, protection, education, health services, welfare services, administrative jobs and jobs in research and design. Critics of the occupationally disaggregated approach were seen in the previous section to argue that rates of return computed in such a framework, underestimate the true returns to education since they do not allow for interoccupational mobility.

The problem of interoccupational mobility can be partially surmounted, though, by applying a "job family" disaggregated approach. When a person decides to change his job, it is much more likely that he will choose one belonging to the same job family than to another job family with a completely different focus. For example, it is a rather remote possibility that someone with a job in the Vehicle Operation job family will move into the Sales, Health or Education job family and vice versa. A "job family" disaggregated approach, therefore, seems able to deal effectively with the problem of interoccupational mobility while, at the same time, providing some degree (even limited) of standardization with respect to ability and socio-economic background.

(3) Earnings Function Analysis in the Banking Sector of Greece

The exceptional feature of this study is that it

has used data pertaining to the population and not to a sample of the National Bank of Greece (only full-time employees were included in the data; part-time and cleaning staff were excluded). The Bank, incidentally, belongs to the 100 biggest financial conglomerates of the world with numerous branches overseas including three in London alone.

In post-war Greece, the banking system, in close collaboration with the State, played a major role in the growth and direction of the productive forces. Whereas, during the early inter-war period, there was a plethora of small banking establishments, after the 1929 economic crisis, amalgamations began. Then after the Civil War, which ended in 1950, a very complex process of mergers and take-overs, resulted in the emergence and consolidation today of a duopolistic situation in which two giant commercial banks control virtually all economic transactions: The National Bank of Greece and the Commercial Bank of Greece, mainly owned by a variety of public corporations through which the state has majority control.

To give an idea of the degree of concentration in banking, it suffices to say that, in 1962, the assets of these two concerns amounted to 96.3% of the assets of all Greek commercial banks together.¹ If one also takes into account that Greek banking capital is growing much faster

1. D. Psilos, Capital Market in Greece. Athens: Centre of Economic Research, 1964, pp. 185-6.

than industrial or merchant capital, the enormous power of these two establishments becomes clear. Between them, they handle not only 90% of the country's considerable savings, but also participate directly in the ownership and management of an important part of the insurance and industrial sector. As far as industry is concerned, quite apart from enterprises under direct bank ownership, the banking system has very tight control by means of its credit policies. This control is particularly strict in Greece because, due to the exceptional weakness of the stock market, not many alternatives for financing are available to Greek entrepreneurs. At least up to the late 'fifties, Greek industrial and commercial capital was highly dependent on the commercial banks, not only for short-term but also for long-term financing.

(a) Fringe benefits

In Greece, Banking Sector employees are considered a privileged class of Public Sector employees, basically because of a more generous allowance and fringe benefit system. Fringe benefits¹ can be classified into two categories:

- (i) pecuniary benefits, defined as goods, services or deferred money income received by the employee but

1. For a good review of the literature on fringe benefits, see G. Psacharopoulos, Earnings and Education in OECD Countries. Paris: OECD, 1975, ch. 6.

paid for by the employer. Examples of this kind of benefit include medical insurance, pension plans, paid vacations and sick leave, free or subsidized meals or merchandise, stock options, low interest loans, etc.

(ii) Nonpecuniary benefits¹, which, in turn, can be divided into two categories:

(a) Working Conditions - examples of working condition benefits are the health and safety characteristics of the job, the rigidity of work schedule, the degree of work autonomy afforded to the worker and the characteristics of grievance procedures. Some working conditions (such as adequate lighting or noise level) impose clearcut and potentially measurable costs on employers, while others (such as autonomy) are more difficult to quantify. Furthermore, the benefits of certain working conditions may depend upon the characteristics of the employees. Autonomy, for example, may not be considered a benefit to all individuals.

(b) Consumption Benefits - comprising the positive flow of satisfaction provided by the work

1. For an interesting attempt to estimate nonpecuniary benefits, see J.G. Duncan, "Earnings Functions and Nonpecuniary Benefits", Journal of Human Resources, Fall, 1976, pp. 462-83.

situation. Enjoyability is a consumption benefit of some jobs, as are the interest, challenge and social relationships. Most consumption benefits represent subjective reactions of individuals to the job situation. As such, they are much more difficult to evaluate than either pecuniary benefits or most working conditions.

Earnings data, as usually recorded in official statistics, do not take into account fringe benefits. If more educated employees enjoy more fringe benefits than less educated do, then crude earnings differentials are expected to underestimate the returns to education.

The data provided by the National Bank of Greece¹ (the earnings data refers to salaries paid out in October 1978) allow for the direct or indirect calculation of various pecuniary fringe benefits. They are the following:

- (1) Annual bonuses and annual vacations with pay.

Instead of receiving 12 months' salary during the year, the bank employee receives 14½ months' salary, one extra salary during Christmas, half a monthly salary during Easter and half a monthly salary during the summer. In addition, he receives an extra half-monthly salary as a bonus.

- (2) Overtime pay. Overtime of up to 20 hours a month receives an extra 25% on top of the standard hourly

1. I am indebted to this-organisation for providing the tape with the relevant data.

wage rate. Any additional overtime receives a standard 200 Dr. (£2.0) per hour.

- (3) Employers' contribution to (a) pension funds, (b) provident funds, (c) medical care and hospitalization funds. The National Bank of Greece pays 30% of total gross earnings to these funds which provide (i) pensions after retirement; (ii) an auxiliary pension amounting to 45% of the standard pension; (iii) a lump sum after retirement of at least £10,000, according to years of experience and grade (senior managers may receive up to £40,000); (iv) medical care and hospitalization both before and after retirement.
- (4) Housing loans and supplementary housing loans of up to 1,000,000 Dr. (£10,000), repayable in a period of 20 years at an annual interest rate of 4%. Surprisingly or not, the data revealed that some employees surpassed the borrowing limit.
- (5) Personal loans of up to 3 months' salary, repayable in 16 months' time at an annual rate of interest of 4%.
- (6) Low interest loans (at 4%) to buy certain consumer durables.
- (7) Housing allowances, between 60% and 100% of the rent paid, for those employed in provincial branches (according to their grade in the hierarchy),
- (8) Fuel allowances for those employed in the northern,

colder parts of Greece.

- (9) Automobile allowance for top management employees.
- (10) Allowance for children's school fees, reaching up to one-third of the total outlay.

How has the monthly value of these fringe benefits been imputed ?

Overtime pay, employers' contributions to the various funds, housing and fuel allowances were simply added to gross earnings. For bonuses, the extra $2\frac{1}{2}$ months' salary that each employee receives, was divided by 12 and the imputed value was added to the gross monthly earnings. For the children's school fees allowance, the total amount provided was divided by 12 and the imputed value was added to monthly earnings. Imputation of the fringe benefits of low interest loans was made as follows: the data provided for the monthly repayments to these loans at the 4% interest rate. I then computed the monthly repayments at the arbitrary 15% rate (to reflect the unsubsidized, free market interest rate) and subtracted the latter value from the former. The imputed monthly value was then added to the earnings stream.

The total monthly value of the fringe benefits was added to the gross sum of:

- (a) Basic Salary (the Internal Basic Salary Structure can be found in Appendix II).
- (b) Family Allowances (10% extra for wife or husband and 5% for every child).

- (c) Many years of service allowance:
 - (For over 5 years of service 5% of basic salary
 - For over 10 years of service 10% of basic salary
 - For over 15 years of service 15% of basic salary
 - For over 20 years of service 20% of basic salary
 - For over 25 years of service 25% of basic salary
 - For over 30 years of service 30% of basic salary)
- (d) Allowance for holding higher degrees (ranging from 15% - 40% of basic salary).
- (e) Special allowances for belonging to the highest six grades of the hierarchy ranging from £8 to £80 (monthly).
- (f) Allowances for holding positions requiring considerable technical skills (like computer operators) or effort levels (like bank tellers, branch managers, telephonists, information analysts).

(b) Regression Results

Having arrived at a comprehensive calculation of the monthly compensation package, let us now turn to earnings function analysis.

Table 9 presents the regression results of monthly earnings (regressions (1) and (2)) and log earnings (regressions (3) and (4)) on sex, education (in both continuous and dummy form), experience and experience². Three dummy variables, are also included to check whether the

locational characteristics of the particular branch in which the persons are employed have an independent effect on earnings. The 3 dummies in question are BRAN 1, BRAN 2 and BRAN 3. BRAN 1 takes the value of 1 if the branch in question is located in the Athens area, BRAN 2 takes the value of 1 if the branch is located in towns of over 10,000 people and BRAN 3 takes the value of 1 if the branch is located abroad (provincial branches constitute the excluded category). Two additional dummy variables KLAD 1 and KLAD 2 were used to test whether white-collar employees receive more or less earnings than engineers and technical workers: KLAD 1 takes the value of 1 if the employee is engaged in administrative, clerical, sales and research work. KLAD 2 takes the value of 1 if the employee happens to be an engineer or technical worker (e.g. engineer in the computing unit of the Bank). Security guards are the excluded category.

Five educational dummies were used in regressions (2) and (4). The five educational dummies correspond to the following educational qualifications:

EDUC 1 - three years of secondary education

EDUC 2 - secondary school completion

EDUC 3 - student in higher education

EDUC 4 - university first degree

EDUC 5 - postgraduate degree (M.A. or Ph.D).

Primary school completion is the excluded category.

The results from all four regressions in Table 9 can be summarised as follows: (Variables are defined in Table 9a.)

Sex seems to have an independent effect on earnings. But this is to be expected since males are doing more overtime than females. An extra year of education raises earnings by 1176 Dr. in regression (1) or by 2.6% in regression (3).

Turning to regression 4 which includes education as a dummy variable we see that only EDUC 4 and EDUC 5, which correspond to university education and postgraduate education respectively, have a substantial influence on earnings. A university degree raises earnings by 18% over a secondary school certificate. A postgraduate degree (M.A. or Ph.D) raises earnings by less than 1% over a first degree.

With respect to the locational dummies, we observe that the excluded category, i.e. branches in the provinces, are associated with higher earnings than the branches situated in the capital and the big cities. The obvious explanation is that employees are attracted to the provinces through a more generous allowance system (e.g. free lodgings or housing allowances). Employees working abroad (BRAN 3) receive a much lower salary than domestic employees. They do receive a double salary, one paid abroad in foreign

TABLE 9

GREEK BANK EMPLOYEES

REGRESSION RESULTS OF EARNINGS EQUATION IN WHICH THE
DEPENDENT VARIABLE IS MONTHLY AND LOG MONTHLY EARNINGS

(standard errors in parentheses)

*Coefficient insignificant at both the 5% and 1% level.

** Coefficient significant at 5% but not at the 1% level.

	(1)Y	(2)Y	(3)log Y	(4)log Y
Constant	2789 (596)	13030 (577)	9.440 (.018)	9.695 (.017)
SEX	4451 (238)	4290 (238)	.111 (.007)	.106 (.007)
EDUC	1176 (46)	-	.026 (.001)	-
NEXP	1633 (37)	1550 (37)	.066 (.001)	.064 (.001)
NEXP ²	-4.8 (1.2)	-2.7** (1.2)	-.0008 (.00003)	-.0008 (.00003)
KLAD 1	-799* (489)	1577 (547)	.025* (.015)	.093 (.016)
KLAD 2	6646 (727)	7646 (729)	.221 (.022)	.249 (.022)
BRAN 1	-236* (306)	-411* (304)	-.028 (.009)	-.034 (.009)
BRAN 2	-742 (245)	-565** (243)	-.035 (.007)	-.031 (.007)
BRAN 3	-25164 (1618)	-25531 (1592)	-.776 (.049)	-.787 (.049)
EDUC 1	-	-1572 (547)	-	-.073 (.016)
EDUC 2	-	1629 (532)	-	-.003* (.016)
EDUC 3	-	1595 (602)	-	-.018* (.018)
EDUC 4	-	9132 (559)	-	.181 (.017)
EDUC 5	-	9207 (1592)	-	.188 (.049)
R ²	.696	.706	.643	.654

TABLE 9a
GREEK BANK EMPLOYEES
Variable Definitions

SEX	- 1 if male 0 if female
NEXP	- Years of work experience
NEXP ²	- Square of previous variable
EDUC	- Years of schooling completed
EDUC 1	- 1 if three years of secondary education 0 otherwise
EDUC 2	- 1 if secondary school graduate 0 otherwise
EDUC 3	- 1 if student in higher education 0 if otherwise
EDUC 4	- 1 if university first degree holder 0 otherwise
EDUC 5	- 1 if postgraduate (M.A. or Ph.D. holder) 0 otherwise
Primary school graduates is the excluded category	
KLAD 1	- 1 if employed in clerical or administrative work 0 otherwise
KLAD 2	- 1 if engaged in engineering or technical work 0 otherwise
BRAN 1	- 1 if branch is in Athens area 0 otherwise
BRAN 2	- 1 if branch in towns of over 10,000 people 0 otherwise
BRAN 3	- 1 if branch is located abroad 0 otherwise.

exchange and the other paid in Greek Dr. in Greece. Only the second salary appears in the data and, therefore, the explanation of the negative coefficient of BRAN 3.

Turning to the dummies KLAD 1 and KLAD 2, we see that the coefficient of KLAD 1 is not significantly different from zero in three out of the four regressions. The coefficient of KLAD 2 is highly significant in all equations, which show that engineers and technical specialists receive, other things being equal, 6069 Dr. more or 16% more than the employees in KLAD 1, simply because of differential allowances for "technical capacity" (Regressions 2 and 4).

In order to calculate the private rate of return to a university degree as compared with a secondary school certificate, regression adjusted experience-earnings profiles are used. The regression model

$$\text{Log } Y = a + b \text{ NEXP} + c \text{ NEXP}^2$$

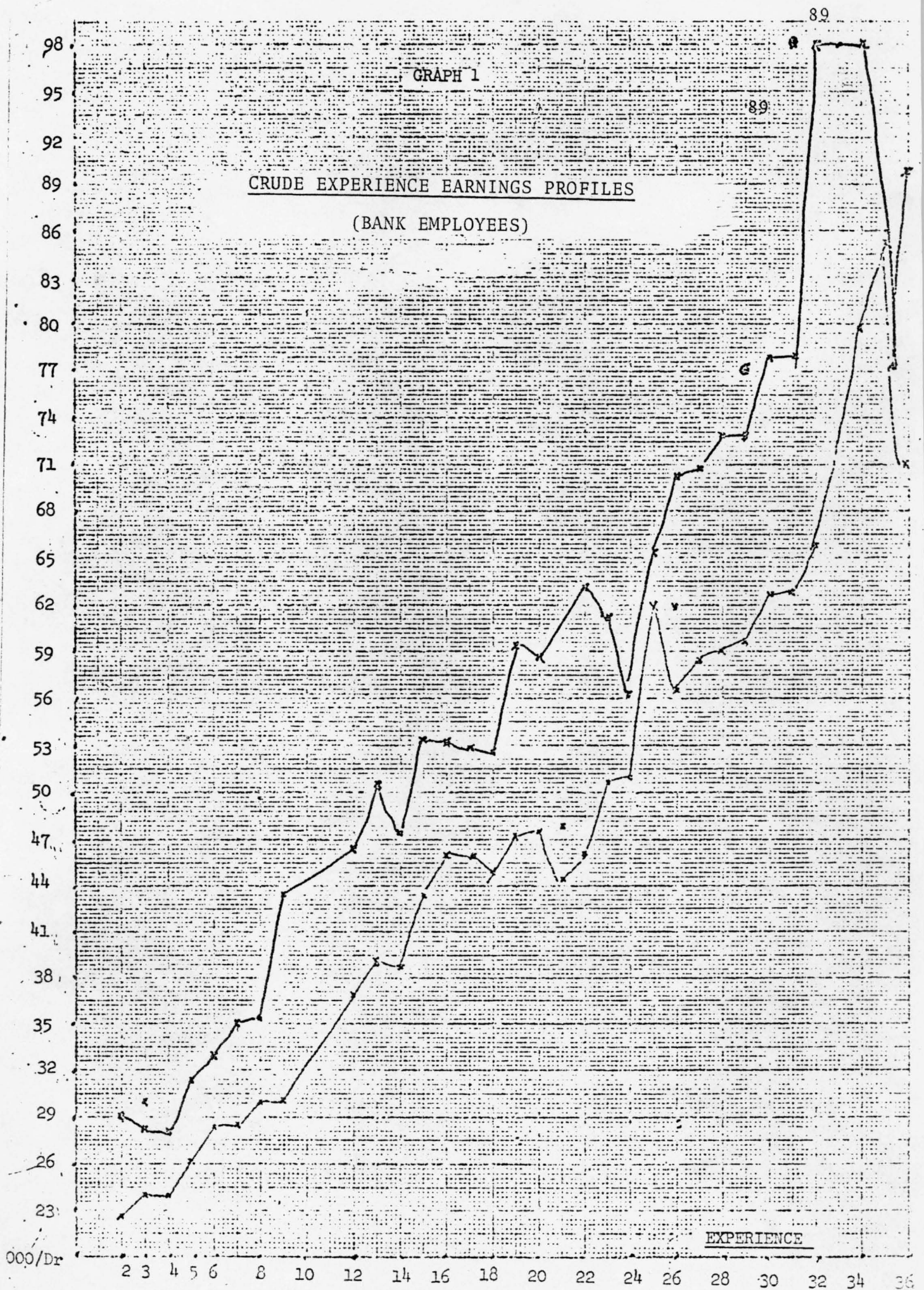
where Y is income and NEXP are years of experience is estimated from the data for the two educational categories separately. What is being done, therefore, is smoothing out the crude experience earnings profiles that appear in Graph 1. The regression adjusted experience-earnings profiles appear in Graph 2 and the results are presented in Table 10.

An additional point deserves attention. Since a university graduate is assumed to enter the labour force four years later than a secondary graduate, he has a lower probability of being married at the time of recruitment. Non-standardization for marital status will, therefore,

GRAPH 1

CRUDE EXPERIENCE EARNINGS PROFILES

(BANK EMPLOYEES)



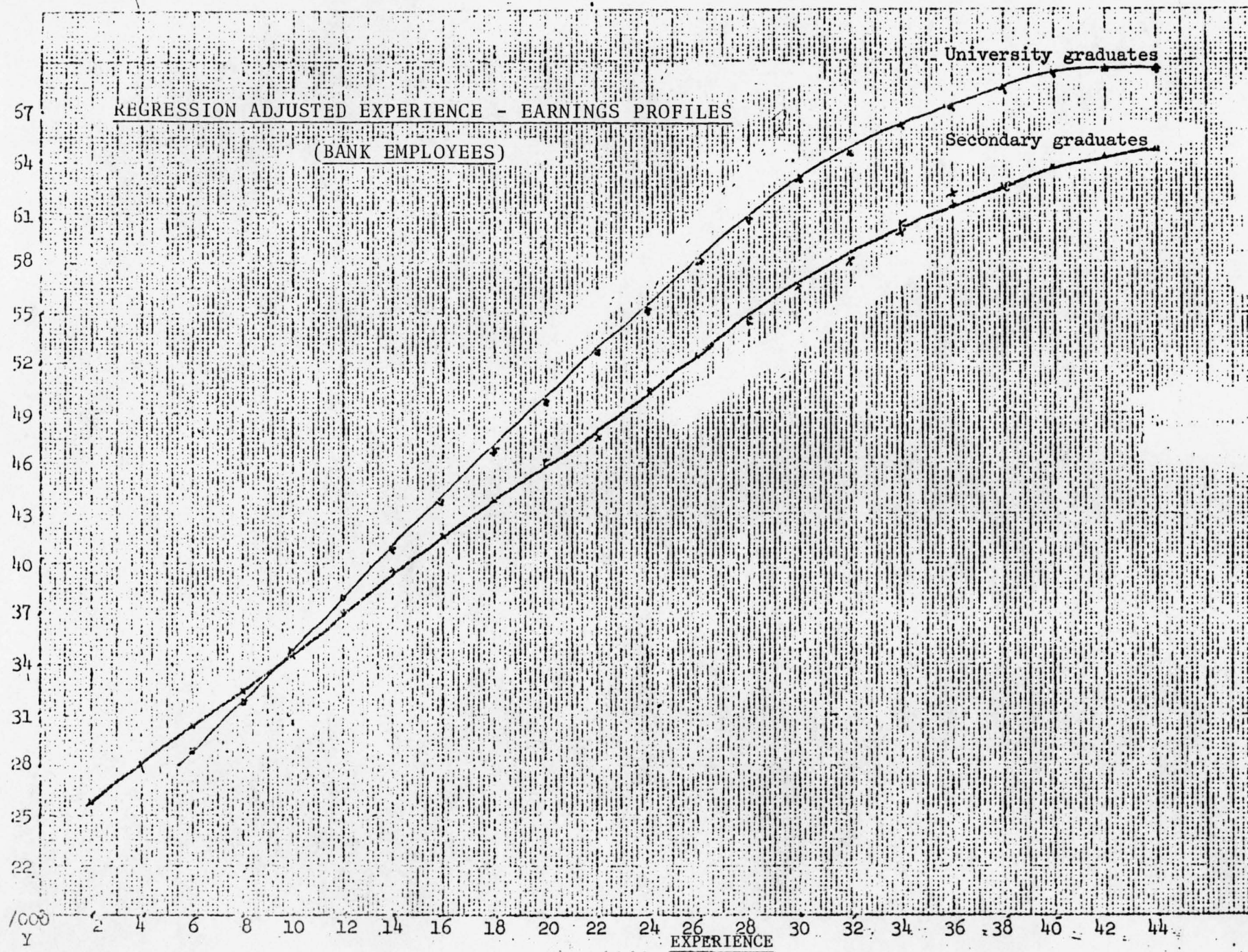


TABLE 10
MARRIED BANK EMPLOYEES
REGRESSION RESULTS OF MONTHLY LOG AFTER TAX
EARNINGS ON EXPERIENCE AND EXPERIENCE²

(standard errors in parentheses)

Secondary School Graduates

	Both Sexes	Males	Females
Constant	9.969 (.010)	10.090 (.014)	9.987 (.013)
NEXP	.047 (.001)	.041 (.002)	.043 (.002)
NEXP ²	- .0005 (.00004)	- .0004 (.00005)	- .0004 (.00009)
R ²	.627	.559	.660
No. of Observations	3326	2250	1076

University Graduates

	Both Sexes	Males	Females
Constant	10.084 (.014)	10.182 (.018)	10.012 (.024)
NEXP	.057 (.002)	.050 (.002)	.051 (.006)
NEXP ²	- .0008 (.00006)	- .0006 (.00007)	- .0007 (.0002)
R ²	.677	.624	.553
No. of observations	1229	957	272

Notes: All coefficients are significant at the 1% level.

underestimate the returns to higher education since a married man with two children receives roughly 20% more than an unmarried man. In the calculation of rates of return, therefore, standardization for marital status has been undertaken.

Having done that, we repeat the exercise for the Civil Service.

(4) Earnings Function Analysis in the Civil Service Sector of Greece

This study is based on a sample of 2011 civil servants drawn from five ministries in the Athens area in 1977.¹

The only earnings data available were basic salary, gross salary and net salary (net = gross - tax - employees' contributions to various funds). These data did not contain fringe benefits and cannot distinguish between the various allowances, like premiums for holding university degrees, family allowances, etc. But in contrast to the banking sector, the data on educational qualifications are richer, since they distinguish between different special subjects of study in

1. These data formed part of a larger set of data used by G. Psacharopoulos and A. Kazamias in a research project sponsored by the Ministry of Education. I am indebted to G. Psacharopoulos, on whose recommendation the Ministry of Education gave me its permission to use the data.

university education and they also distinguish between different sorts of postgraduate education like Diplomas, M.A.'s or Ph.D.'s.

Table 11 presents the regression¹ results with education in continuous and dummy form; variables are defined in Table 11a. In regression 1, monthly gross salary is regressed on sex, education (in continuous form), experience and experience². In regression 2, monthly gross salary is regressed on the same variables but with education in dummy form. A university Arts degree (includes all social sciences like law, economics, politics, etc.) is associated with an extra $(5956 - 2865) = 2091$ Dr. over a secondary school degree. An engineering degree from Athens Polytechnic (5 years of study) is associated with an extra $(13026 - 5956) = 7070$ Dr. over an Arts degree. An M.A. or Diploma holder gets $(7294 - 5956) = 1338$ Dr. more than an Arts degree holder. A Ph.D. holder receives on average $(23466 - 7294) = 16172$ Dr. more than a M.A. or Diploma holder and 17510 Dr. more than an Arts degree holder. Equation 3 regresses log monthly salaries on the same variables with education in continuous form while Equation 4 regresses

1. In all regressions in-firm experience is used as a proxy for total experience in preference to age. 95% of the Civil Servants in the sample entered the Service under 30 years of age and it is reasonable to assume that in-firm experience is the only form of experience that matters. This remark holds for the banking sector as well.

TABLE 11
GREEK CIVIL SERVANTS
REGRESSION RESULTS OF EARNINGS EQUATION IN WHICH THE
DEPENDENT VARIABLE IS MONTHLY AND LOG MONTHLY EARNINGS
 (standard errors in parentheses)

	(1) Y	(2) Y	(3) log Y	(4) log Y
Constant	4194 (305)	2525 (342)	8.612 (.020)	8.469 (.021)
EDUC	137 (12)	-	.010 (.0008)	-
NEXP	374 (31)	346 (26)	.050 (.002)	.047 (.001)
NEXP ²	1. * (.8)	1.8 (.672)	- .0005 (.00005)	- .0005 (.00004)
SEX	1548 (151)	1018 (133)	.095 (.010)	.062 (.008)
EDUC 1	-	1982 (447)	-	.114 (.028)
EDUC 2	-	2865 (292)	-	.241 (.018)
EDUC 3	-	5956 (287)	-	.463 (.018)
EDUC 4	-	13026 (985)	-	.944 (.063)
EDUC 5	-	2139** (984)	-	.246 (.062)
EDUC 6	-	7294 (745)	-	.520 (.047)
EDUC 7	-	23466 (2516)	-	1.015 (.160)
EDUC 8	-	2265** (924)	-	.206 (.059)
R ²	.662	.775	.701	.818

Notes: Number of observations - 1712

* Coefficient insignificant at both 1% and 5% level

** Coefficient significant at 5% but not at 1% level

TABLE 11a
GREEK CIVIL SERVANTS
Variable Definitions

EDUC	=	years of schooling completed
NEXP	=	years of work experience
NEXP ²	=	square of previous variable
SEX	=	1 if male, 0 if female
EDUC 1	=	1 if three years of secondary education zero otherwise
EDUC 2	=	1 if secondary school graduate zero otherwise
EDUC 3	=	1 if social science or arts university graduate zero otherwise
EDUC 4	=	1 if engineering graduate zero otherwise
EDUC 5	=	1 if holder of technical school certificate zero otherwise
EDUC 6	=	1 if Diploma or MA holder zero otherwise
EDUC 7	=	1 if Ph.D holder, zero otherwise
EDUC 8	=	1 if classified as student zero otherwise

Primary school completers are the excluded category.

log monthly salaries on the same variables again but with education in dummy form. Being male rather than female is associated with 6.2% more pay. As noted before, this is hardly surprising since women tend to do less overtime than men and they are not as easily promoted to the higher grades of the service which are traditionally male dominated. Turning to the educational dummies we see that completion of three years of secondary school is associated with 11% more salary than primary school completion, everything else being the same. An arts degree holder is getting 22% more than a secondary graduate. An engineering degree is associated with $(.944 - .463) = 48\%$ more salary over an arts degree. A Ph.D. holder is getting 101% more salary than a primary graduate, 76% more than a secondary graduate, and 54% more than an arts graduate. if, again, all other variables are held constant.

The above results point to extremely high rates of return to Ph.D. and engineering degrees. They should be interpreted though with caution since the number of cases possessing engineering degrees or Ph.D.'s is less than 15. Therefore, in the private rate of return results in the next section, the rate of return to an arts higher education is calculated as compared with secondary education. These two educational categories comprise more than 1600 out of 1712 total number of cases.

As in the case of the banking sector, the rates of return are calculated from regression adjusted experience -

earnings profiles, i.e. by fitting a regression of the form $\log Y = a + b \text{ NEXP} + \text{NEXP}^2$ for each of the two educational categories which is effectively smoothing out the crude experience-earnings profiles. The results appear in Table 12 and the plot of the crude and regression adjusted profiles in Graph 3.

(5) Private Rates of Return to University Education in the Greek Banking Sector and the Civil Service.
The Case of Infinite Rates of Return to a First and a Second First Degree

Tables 13 and 14 present the private rates of return to university education for the Banking and the Civil Service sector of Greece respectively. The only pecuniary costs included in the calculations are the four full years of forgone earnings whilst at university, since tuition fees have been abolished since 1964 and books and notes are publicly provided.

The results, rates of return of 1.5% for males and 0% for females in the Banking Sector and 6% and 4.5% respectively in the Civil Service, seem unable to explain, at first sight, the well established phenomenon of the "overeducated" Greek. These rates of return, however, should be interpreted as minimum rates of return. As will be explained below, some peculiar characteristics of the Greek educational system and of government pay legislation allow for the realization of even infinite rates of return

TABLE 12
CIVIL SERVANTS
REGRESSION OF MONTHLY LOG AFTER TAX EARNINGS ON
EXPERIENCE AND EXPERIENCE²
(standard errors in parentheses)

Secondary School Graduates

	Males	Females
Constant	8.722 (.034)	2.655 (.020)
NEXP	.058 (.004)	.057 (.002)
NEXP ²	- .0008 (.0001)	- .0007 (.00007)
R ²	.704	.789
No. of Observations	299	489

University Graduates

	Males	Females
Constant	9.059 (.029)	8.985 (.019)
NEXP	.035 (.003)	.038 (.002)
NEXP ²	- .00009* (.00007)	- .0002 (.00007)
R ²	.754	.897
No. of Observations	530	223

Notes: * Coefficient insignificant at both the 5% and 1% level.

GRAPH 3

CIVIL SERVANTS

CRUDE AND REGRESSION ADJUSTED

EXPERIENCE - EARNINGS PROFILES

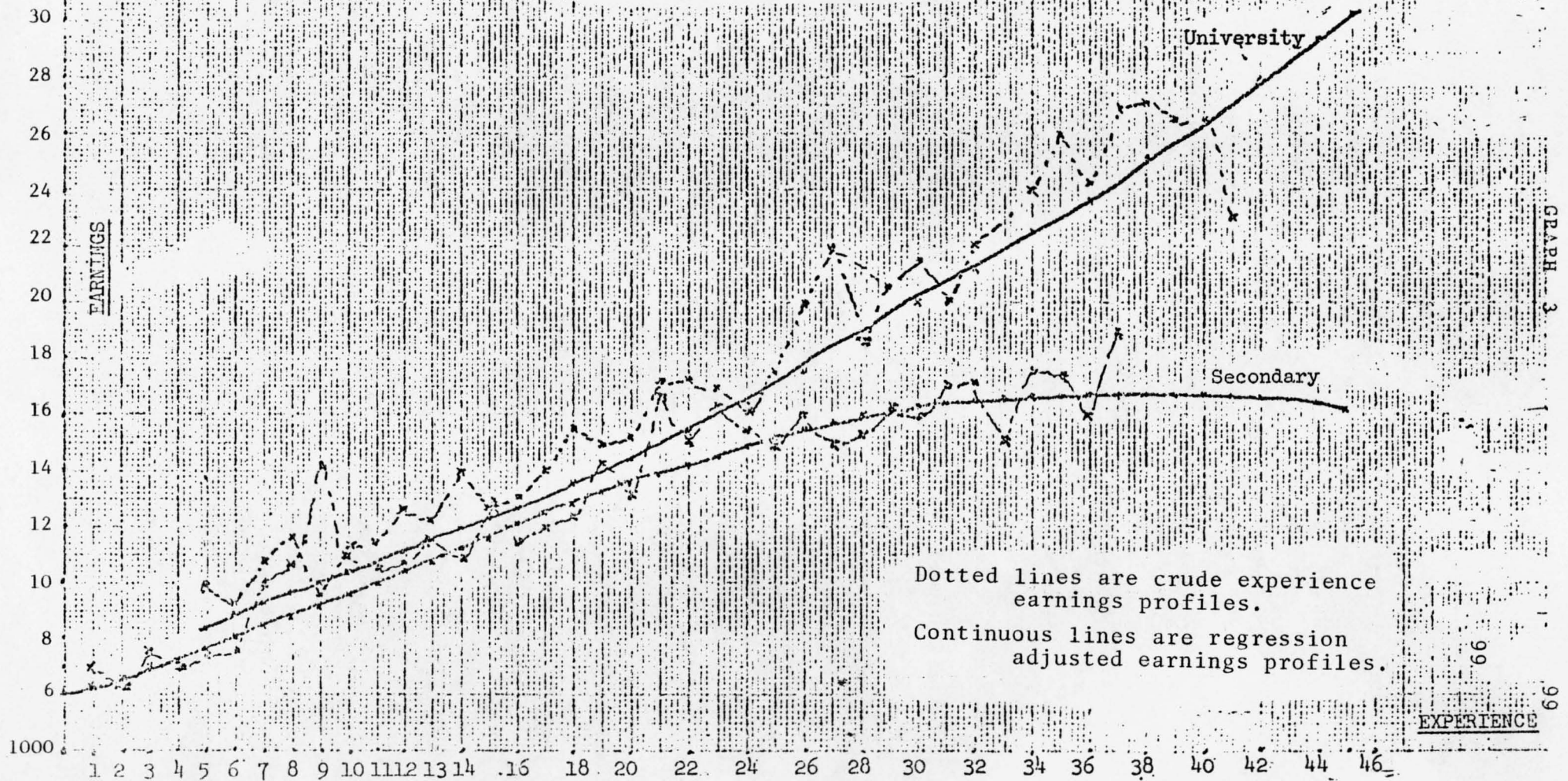


TABLE 13
PRIVATE RATES OF RETURN¹ TO UNIVERSITY EDUCATION
(MARRIED BANK EMPLOYEES)

<u>Private Rates of Return</u>	
Both Sexes	.011
Males	.015
Females (a)	.000
Females (b)	- .025

- Notes: (i) The only costs assumed in the calculation of rates of return are four years of forgone earnings.
- (ii) There is a compulsory retirement age of 65 for males and 60 for females in the Banking Sector. Therefore, male secondary completers are assumed to stay in the labour force for 44 years and university graduates 40 years. Females have the option of earlier retirement and, therefore, two rates of return are being calculated, (a) assuming 41 and 37 years of service for secondary completers and graduates respectively and (b) assuming 30 and 26 years.

1. I am indebted to G. Psacharopoulos for kindly providing the Fortran program which made the calculation of the above rates of return possible.

TABLE 14
PRIVATE RATES OF RETURN TO UNIVERSITY EDUCATION
IN THE GREEK CIVIL SERVICE

<u>Private Rates of Return</u>	
Both Sexes	0.065
Males	0.060
Females (1)	0.045
Females (2)	0.000

- Notes:
- (i) The only costs assumed in the calculation of rates of return are four years of forgone earnings.
 - (ii) There is a compulsory retirement age of 65 for males and 60 for females in the Civil Service. Therefore, male secondary completers are assumed to stay in the labour force for 44 years and university graduates 40 years. Females have the option of earlier retirement and, therefore, two rates of return are being calculated, (a) assuming 41 and 37 years of service for secondary completers and graduates respectively and (b) assuming 30 and 26 years.

to higher education.

The Greek higher educational system displays some unique features:

- (a) It does not impose any time limit upon the completion of a university degree;
- (b) there is no compulsory attendance at lectures or classes;
- (c) even if the student fails one or more subjects in the June examination, he has another two examination periods to put things right.

The conditions mentioned above, permit a person, no matter whether he attends lectures or passes examinations, to register as a student for the rest of his life. Moreover, pay legislation in both the Civil Service and the Banking Sector provide a premium for holding a university degree, no matter when it is obtained.

The facts mentioned above render the following sequence of events perfectly possible: a person after graduating from secondary school passes the entrance examinations for Greek Universities and soon afterwards finds a job in the Civil Service. After a period of time, no matter whether short or long, he manages to receive his degree and automatically qualifies for the premium granted to all degree holders.

In such a hypothetical case, it is evident that the individual forgoes zero earnings whilst he is registered as a student and hence the rate of return to his

educational investment is almost infinite. It is almost, and not precisely infinite, since the person incurs direct monetary and psychic costs to pass the university entrance examination. Direct monetary costs consist of fees paid to the so-called Frontisteria, or crammers, which undertake to prepare the students for the entry examinations.¹

Although the assumption of zero foregone earnings is, admittedly, an extreme (albeit realistic) possibility, it serves to highlight the fact, usually neglected in the literature, that rates of return are extremely sensitive to the number of years of forgone earnings, as well as to the magnitude of these earnings. In the Greek public sector, state legislation allows the number of years of forgone earnings to range between zero and four. (Four years is the length of the university courses). Since, in effect it allows people to choose rates of return ranging from zero (or even negative values) to infinity, it becomes obvious that people would try to realise a value closer to the latter than to the former. Table 14a presents rates of return to university education in the Banking and Civil Service Sector of Greece, under different assumptions about the years of forgone earnings (which can range from 0-4). It can be seen that by assuming one year of forgone earnings in the discounting process, rates of return double as compared with those assuming four years of forgone earnings.

But let us now turn to some evidence supporting the hypothesis that private rates of return are much larger than the calculation assuming four years of forgone earnings would suggest.

1. More than 100,000 secondary school students are attending these privately owned frontisteria in Athens alone, in their frantic scramble for access to higher education.

TABLE 14a

RATES OF RETURN TO UNIVERSITY EDUCATION IN THE CIVIL SERVICE
AND BANKING SECTOR OF GREECE UNDER ALTERNATIVE ASSUMPTIONS
ABOUT YEARS OF FORGONE EARNINGS

<u>Civil Service</u>		<u>Banking Sector</u>	
<u>Years of Forgone Earnings</u>	<u>Rate of Return</u>	<u>Years of Foregone Earnings</u>	<u>Rate of Return</u>
1	0.115	1	0.155
2	0.085	2	0.11
3	0.07	3	0.09
4	0.06	4	0.075

- Notes: (a) The Rates of Return to the Civil Service are calculated for males only.
- (b) The Rates of Return to the Banking Sector are calculated using the Internal Basic Salary Pay Structure that appears in Appendix II.

An obvious way to test the hypothesis that the length of the university course differs from the number of years of forgone earnings is to check how many people received their degrees whilst working or, alternatively, to look at the proportion of employees classified as students. Running a frequency distribution on the educational qualifications variable, 1025, out of the total 9405 bank employees, were found to be classified as students. Looking at the age distribution of these employees, 70% of them were less than 30 years old, which, in turn, implied that they stand a good chance of receiving the university degree during their working life. Some additional evidence supporting the inequality of years of forgone earnings and years of study was provided by the results of a questionnaire survey distributed to all candidates of the big Pan-Hellenic examination of the 11.12.77 for entry in the National Bank of Greece.¹ Out of 8919 candidates, 2397, or 36%, were classified as students. The evidence once again showed that people are perfectly aware of the ways by which they can realise large returns to their educational investments.

Another extraordinary feature that the data for the Greek Civil Service revealed was that almost 8% of the university degree holders possessed not only one but two first degrees.² Three things become immediately apparent:

-
1. I am indebted to the Personnel Department of the National Bank of Greece for providing the detailed questionnaire results.
 2. Some additional scandalous legislation allows the holder of a first degree to register automatically to the third year of another degree. (Having a degree in Law, for example, allows you to register as a third year student in Economics.)

- (a) the holder of a second first degree registered for and was awarded this degree during his working life.
- (b) The second degree is sought because it increases the chances of fast promotion and hence entails higher earnings.
- (c) If, on average, holders of two first degrees are promoted more quickly in the grade and salary scales than holders of one first degree, then the average private rate of return of holding a second first degree (compared with holding only one) becomes infinite.

Enough has been said to demonstrate the fact that institutional forces may well have resulted in large private rates of return to university education in the public sector. These high private rates of return will undoubtedly result in :

- (a) a growing social demand for a further expansion of places in the Greek higher educational system;
- (b) a growing political demand for an increase in public sector jobs;
- (c) since most public sector jobs are located in the capital of Greece, continuing rural-urban migration flows are to be expected.

High rates of return to university education in the public sector coupled with the clientelistic nature of politics especially prevalent in the countryside, may well have

contributed to the fact that more than 40% of the Greek population lives in the Athens area alone.¹

Additionally, another important observation has to be made. Even if earnings of degree holders in the private sector are much higher than those in the public sector, rates of return calculated separately for the private sector will not necessarily exceed those in the public sector since an employee of a private company has no incentive to receive his degree whilst working since doing so will not guarantee him higher pay. Rates of return to higher education in the private sector, may well be lower than rates in the public sector and hence the signals that these two sectors produce might be at odds with each other.²

Finally the incidence of large private rates of return to university education and the implied divergence between private and social rates, raises serious doubts about the practical usefulness of the social rate of return as a social investment criterion. The supply of education by democratically elected governments varies directly with the private returns and hence social returns cease to have any practical significance in educational planning.

(6) Policy Implications

If the OECD forecast, for Greece, that by 1985 94% of the relevant age group will be enrolled in institutions

1. Another related point, usually neglected, is that the 1976 Educational Act which raised the school leaving age to 15, implies at the same time a loss of income for the poorer farmer families (with small landholdings), who profited until now from their adolescent children's labour in the fields. This in turn may well reinforce the rural-urban migration flows and exacerbate the population congestion in the urban centres. An educational reform, therefore, however equitable it may appear, may well have other undesirable social consequences
2. It is interesting to note that Leibenstein, op.cit., also recognised the fact that rates of return in the public sector may well be higher than those in the private sector.

of higher education, proves correct, one has (albeit regrettably) to accept that this phenomenon will be accompanied by considerable "educated" unemployment unless the over-inflated public sector grows to meet the increased supply.

I rather doubt that the social benefits of a highly educated population will outweigh the problems and social unrest that even a transitory cohort of unemployed intelligentsia can create. What then can public policy do to avoid such a potentially dangerous situation ? The answer is clear-cut. Policies to reduce the private present value of investing in higher education must be undertaken. Private returns to investing in education depend on the earnings and unemployment probabilities of educated workers relative to the uneducated and on the private costs of acquiring an education. This points to the areas where leverage might be exerted:

- (a) pecuniary benefits associated with university education can be reduced in the public sector (including the nationalised Banking Sector);
- (b) students can be charged the full cost or part of the cost of their education.

More concretely, the following measures are proposed:

- (i) Make attendance at lectures and other classes

compulsory.

- (ii) Abolish the legislation which allows degree holders to transfer and register to the third year of an alternative degree.
- (iii) Reduce the premium associated with a first degree in the Civil Service and the Banking sector respectively; the productivity in the public sector is so low, that this measure is unlikely to result in any further loss in productivity.
- (iv) Charge the full or part of the costs of a university education. To take account of equity considerations, however, this proposal should be complemented by
 - (a) an income contingent loans scheme at subsidized rates of interest, extending to a minimum of 25 years or a graduate tax, whereby graduates whose income falls below a minimum level are automatically excused repayment of the loan;
 - (b) a grants system and/or further tax relief to the families with children in the last few years of secondary education and with income under a certain threshold. As mentioned before, attendance at the privately owned frontisteria is an almost

necessary precondition for passing the entrance examinations for Greek Universities. Consequently, if educational planners are interested in equalizing access to education they should provide direct or indirect help to low-income families in the last few years of secondary education.¹

- (v) Since the official exchange rate is artificially kept undervalued by the Greek monetary authorities, students studying abroad should buy foreign exchange at its higher, real (shadow) price.

Proposals (i) and (ii) will exclude the possibility of infinite private returns to higher education, since working and studying will no longer be compatible. Proposal (iii) will affect the pecuniary benefits associated with university education and hence will act to reduce the rates of return. Proposals (iv) and (v) will undoubtedly increase the cost of acquiring higher education and hence diminish the pay-off of the educational investment. People should come to realise that education is not a free, costless public good and that government allocations to higher

1. Similar propositions can be found in M. Blaug and M. Woodhall, "Patterns of Subsidies to Higher Education in Europe", Higher Education, November, 1978, pp. 331-361; and in D.M. Windham, "Economic Analysis and the Public Support of Higher Education: The Divergence of Theory and Policy" in D.M. Windham (ed.), Economic Dimensions of Education. Washington: Report of a Committee to the National Academy of Education, 1979.

education may well be used more efficiently elsewhere.

None of the proposals would be easy to implement, given the political power of the groups, whose interests would be adversely affected. But when one considers the disastrous effect on the economic and social development of a country, of continuing to spend scarce public funds to produce a well educated and unemployed population, while many other pressing social needs remain unsatisfied, there is cause for concern.

(7) Conclusion.

Calculation of the private rate of return to university education for the Banking and Civil Service sectors of Greece showed that depending on the assumptions made about foreign earnings, the rate of return can range between zero and infinity.

The absence of any time limit upon the completion of higher degrees, the optional attendance at lectures and classes, and the rigid premium associated with degree holding enables employees in the Greek Public Sector to complete their university studies whilst working, thus reaping large returns to their educational investment.

Large rates of return in the Public Sector in turn will strengthen the social pressures for further expansion of the higher educational system, will strengthen the demand for Public Sector job creation and will encourage

ever growing numbers of people to migrate to the urban centres. All the above will cause continuous headaches to the ruling politicians, but should come as no big surprise. It is very common that pay legislation which assured them of election victory will eventually ensure their downfall.

APPENDIX I

The classical linear regression model is capable of generating spuriously high R's and low standard errors when the error terms of the equation are

- (1) not distributed with zero mean and constant unknown variance;
- (2) they are not distributed independently of each other and independently of the explanatory variables.

Especially the presence of heteroscedasticity (i.e. $\text{var}(u) \neq \text{constant}$) is a common feature of most cross-section data.

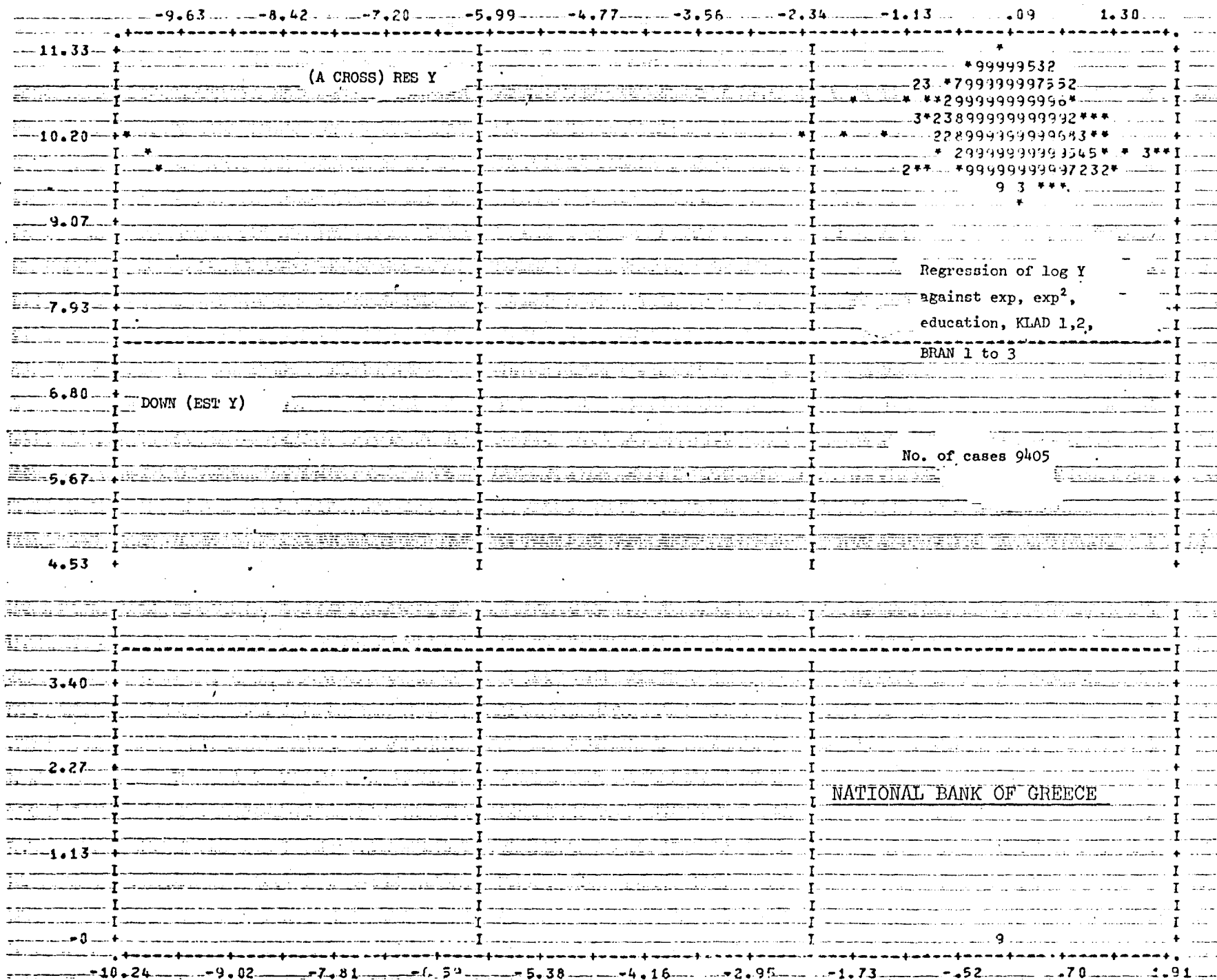
I checked the standard assumptions of (1) homoscedasticity and (2) independence, by plotting the residual values of the dependent variable Y against the predicted values of Y for regressions 2 and 4, that appeared in Table 9 and for regression 2, that appeared in Table 11. The plot, portrayed in Graphs 4, 5 and 6 respectively, yields a spherical, symmetrical pattern of residuals, thus vindicating the use of least squares.

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VALUES OF THE DEPENDENT VARIABLE (REGRESSION (2), TABLE (9))

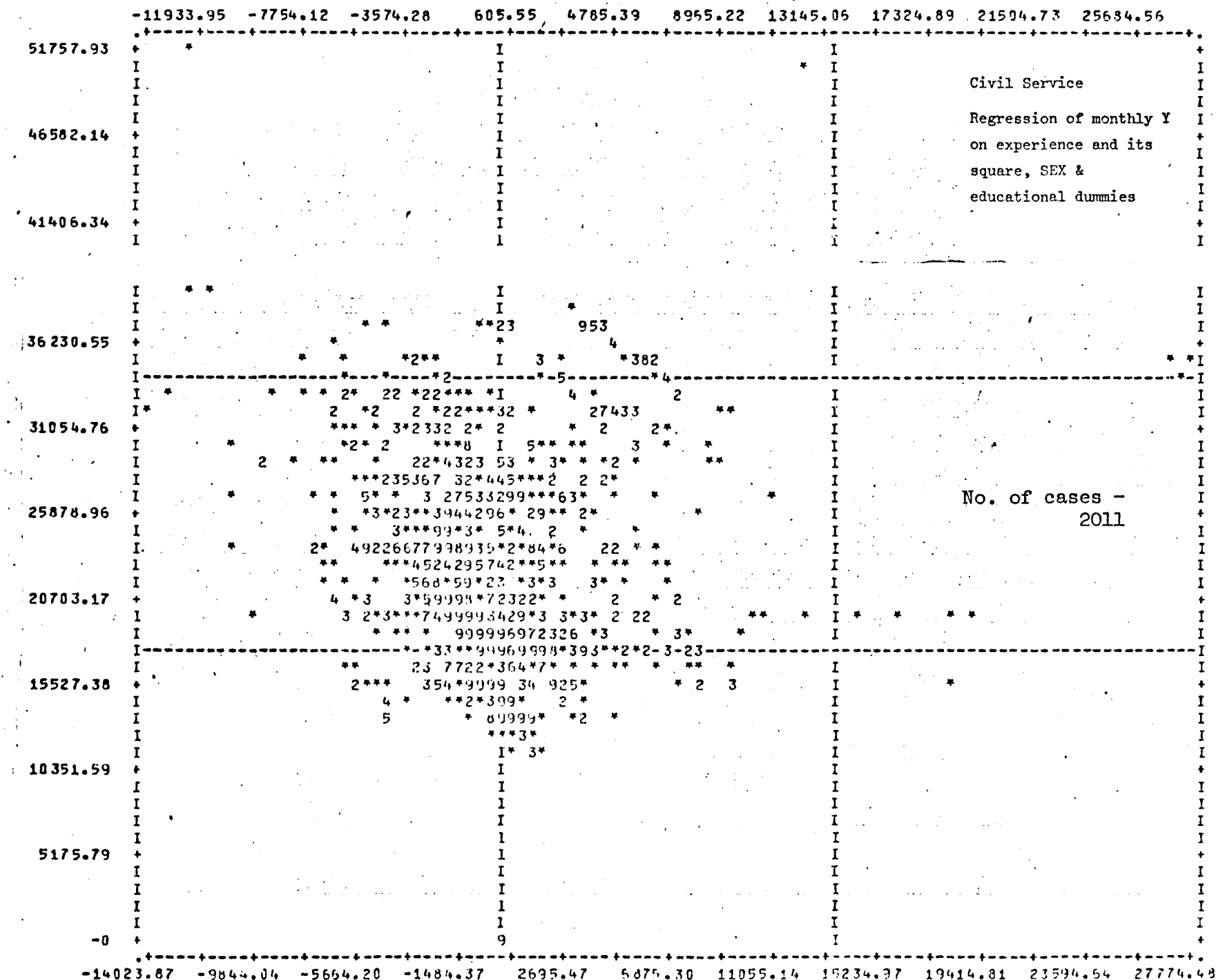
	-32104.27	-14411.92	-3280.42	-20972.76	-38665.11	-56357.45	-74049.80	91742.14	109434.48	127126.83
89428.71										
80485.84										
71542.97										
62680.10										
53657.23										
44714.36										
35771.48										
26828.61										
17885.74										
8942.87										
-0										
-40950.44	-23258.10	-5565.75	12126.59	29819.94	47511.28	65213.62	82895.97	100588.31	118280.66	135973.00

SCATTERGRAM OF THE RESIDUAL AGAINST THE PREDICTED VALUES
OF THE DEPENDENT VARIABLE (REGRESSION (4), TABLE (9))



SCATTERGRAM OF (DOWN) ESTY

(ACROSS) RESY



VALUES OF THE DEPENDENT VARIABLE (REGRESSION (2), TABLE (11))

SCATTERGRAM OF THE RESIDUAL AGAINST THE PREDICTED

GRAPH (6)

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APPENDIX IIInternal Wage Structure (National Bank of Greece)

(1978)

(1) Years	(2) Grade	(3) Basic Salary (Dr)	(4) Years	(5) Additional % increase to Basic Salary	(6) Basic Salary - (Total)
0	I	7230	0	46%	10556
			2	56%	11279
			4	65%	11930
			6	74%	12580
			9	83%	13231
			12	85%	13376
2	II	8000	2	45%	11600
			4	55%	12400
			6	69%	13520
			8	74%	13920
			10	83%	14640
			12	85%	14800
6	III	9070	6	50%	13605
			8	56%	14149
			10	66%	15056
			12	76%	15963
			14	84%	16689
			16	85%	16780
10	IV	10020	10	56%	15631
			12	63%	16333
			14	72%	17234
			16	78%	17836
			18	85%	18537
15	V	12560	15	50%	18840
			17	56%	19594
			20	66%	20850
			23	77%	22231
			26	80%	22608

Appendix II continued

(1) Years	(2) Grade	(3) Basic Salary (Dr)	(4) Years	(5) Additional % increase to Basic Salary	(6) Basic Salary - (Total)
18	VI	12990	18	50%	19485
			20	61%	20914
			23	70%	22083
			26	75%	22733
			29	80%	23382
21	VII	14110	21	48%	20883
			23	65%	23282
			26	73%	24410
			29	80%	25398
24	VIII	15740	24	49%	23453
			26	54%	24240
			29	68%	26443
			32	80%	28332
27	IX	16690	27	51%	25202
			29	67%	27872
			32	80%	30042
30	X	18450	30	80%	33210
33	XI	27370	33	80%	49266

- Notes:
- (a) There are 11 grades in the Bank (Column (2)).
 - (b) Column (1) refers to the minimum number of years of in-firm experience necessary for promotion to the relevant grade (e.g. to get promoted to Grade III, someone needs at least six years of previous experience in Grades I and II).
 - (c) Column (3) refers to the basic salary for every Grade.
 - (d) Column (4) refers to the number of years one can stay in a particular Grade and column (5) refers to the percentage increase to the basic salary according to years of experience. Column (6) comprises the total sum of basic salary plus the additional percentage increase to basic salary.

In most cases, a person at a higher grade receives more basic salary than someone at a lower grade, but with the same number of years of experience. Reading the table through, surprisingly enough, one can find two exceptions. An employee at Grade V with 23 years of experience receives 22231 Dr., whilst someone at Grade VI with the same number of years of experience receives 22083. A similar finding applies to Grades VII and VIII with 26 years of previous experience.

CHAPTER 3
ON INTERNAL LABOUR MARKETS

The object of this chapter is to analyse, discuss and elucidate the concept of the "internal labour market" (ILM).

Section (1) discusses the work of C. Kerr and J. Dunlop who provided the first insights on the ILM concept. Section (2) critically assesses the work of P. Doeringer and M. Piore, with which the ILM concept is usually associated, and tries to clarify the difference between that theory and neoclassical economics. Section (3) establishes some criteria that can be used to test for the presence of ILMs. Section (4) provides some evidence on the existence of ILMs in a particular job cluster of the Greek Labour Market, using a four company sample. Section (5) discusses the relationship between ILMs and the Job Competition or Bumping Models developed by L. Thurow and G. Fields respectively. Section (6) discusses the implication of these models with respect to educational demand. Section (7) presents the conclusions.

(1) Labour Market Analysis and the Institutionalists of the '40s and '50s.

There is a long standing fundamental dispute among the proponents of labour market analysis. The

problem is to determine the relative importance of "market forces" (notably maximization of gain by individual buyers and sellers exposed to competitive conditions and confronted by costs of information) and "institutional influences" (usually either behaviour not consistent with optimal exploitation of opportunities for gain or group behaviour designed to provide the members with some insulation from the forces of competition).

The positions of the various parties to the debate might be described by paraphrasing James Tobin's famous statement about a similar debate over the importance of money supply: Market forces do not count; market forces do too count; market forces count for everything. The first position has been attributed to J.R. Commons¹ and most of the older institutionalists before and after the First World War; the third to Milton Friedman and many newer neoclassicists after the Second World War. The second position was originally espoused by the older neoclassicists like Henry C. Simons and later by newer institutionalists like Slichter, Kerr and Dunlop. Their position is most lucidly displayed in Clark Kerr's seminal essay on the "Balkanization of the Labour Markets".² According to Kerr, labour markets are divided into two broad types: (1) the structureless (classical, open), in which (a) there are no unions with seniority and other

1. J.R. Commons, Institutional Economics. Madison: University of Wisconsin Press, 1934.

2. C. Kerr, "The Balkanisation of the Labour Markets" in E. Wight Bakke et al., Labour Mobility and Economic Opportunity. Cambridge: Technology Press, 1954.

rules, (b) the relation between the employer and the employee is a transitory, impersonal one, (c) the workers are unskilled, (d) payment is made by unit of product and (e) little capital or machinery is employed. "The only nexus", says Kerr, between an employer and an employee, "is cash".¹

(2) the structured (closed, internal); although Kerr admits that structure is introduced into labour markets even without institutional rules (he cites the influence of the specificity of skills and the money costs of physical transfer) he strongly believes that institutional rules put added structure into labour markets.

Kerr writes:

Institutional labour markets create truly non-competing groups. Markets are more specifically delimited, and entrance into them, movement within them, and exit from them are more precisely defined The institutionalization of labour markets is one aspect of the general trend from the atomistic to the pluralistic and from the largely open to the partially closed society. ²

According to Keer, internal (structured markets) are classified into two types, (a) guild and (b) manorial. Guild type markets are stratified horizontally. Guild systems tend to predominate in skilled crafts that are highly unionized. Workers remain within an industry or craft, but move freely from firm to firm so long as they have the proper credentials. Admission of outsiders into

1. Kerr, op.cit., p. 95.

2. Kerr, op. cit., p. 96.

the guild system is often closely controlled through training and other requirements, thus preserving the domain of those inside the guild.

Manorial markets emphasize attachment to the place of work and vertical stratification. Ports of entry are few and usually confined to the lower job classification. Movements take place vertically along the job ladder and seniority governs layoffs and other movements within and outside the system.

It is interesting to note that Kerr was careful to acknowledge the important impact of external market forces on manorial structures in a previous essay (with L. Fisher), "The Effect of Environment and Administration on Job Evaluation".¹

During the same period that C. Kerr was writing on "manorial" structures, John Dunlop developed the related concept of the "job cluster". Dunlop has defined a job cluster in the following terms:

It is a stable group of job classifications or work assignments within a firm (wage determining unit) which are so linked together (a) by technology, (b) by the administrative organisation of the productive process, including policies of transfer and promotion or (c) by social custom that they have common wage-making characteristics . 2

One can easily see the link between the two concepts. Different manorial structures can be attached

1. In J.T. Dunlop (ed.), The Theory of Wage Determination. London: Macmillan, 1957.
2. John T. Dunlop, "The Task of Contemporary Wage Theory", in J.T. Dunlop (ed.), The Theory of Wage Determination. London: Macmillan, 1957.

to different job clusters with a one to one correspondence. As will be seen in the next section, the writings of Kerr and Dunlop on manorial structures and job clusters heavily influenced P. Doeringer and M. Piore when they developed the concept of the "internal labour market".

(2) P. Doeringer and M. Piore and the Internal Labour Market Concept

The "internal labour market" (ILM) concept is usually associated with the names of P. Doeringer and M. Piore, who developed the theory of ILMs in their book Internal Labour Markets and Manpower Analysis. In the first place, it seems rather odd that they decided to call a market "an administrative unit, such as a manufacturing plant, within which the pricing and allocation of labour is governed by a set of administrative rules and procedures".¹

The term hierarchical structures (since a lot of emphasis is placed on seniority) or hierarchical job clusters (since these hierarchical structures are associated with specific groupings of jobs within which an employee is customarily upgraded, downgraded or laid off) seems to me a more appropriate phraseology. But since the ILM terminology is well established in labour market literature,

1. P. Doeringer and M. Piore, Internal Labour Markets and Manpower Analysis. Lexington: Heath, 1971, pp. 1-2.

I will keep on using it for the rest of the analysis.

(a) The Origins of the ILMs

The conceptual theoretical portion of the book, which develops the ILM concept, synthesizes the institutional insights provided by Clark Kerr (with respect to manorial structures) with human capital investment theory.

Major stress is laid on (a) enterprise specific skills¹ and (b) employer investment in on-the-job training as cogenerators of the internal labour market. Technology is implicitly responsible for "enterprise specific skills", which can be most efficiently acquired by on-the-job training. Since the firm's investment in the employee has a better chance of being amortized the longer the employee stays with the firm, the employer has every incentive to stabilize employment and reduce turnover so that he can reap the benefits of his investment in on-the-job training. In other words, labour is considered to be a quasi-fixed factor of production, since, besides the wage

1. An enterprise specific skill is defined as a skill unique to a single job classification in a single enterprise, in contrast to a general skill, which is requisite for every job in every enterprise (Doeringer and Piore, *op. cit.*, p. 14). The existence of skills useful to only one employer is a fuzzy concept. Doeringer and Piore try to clarify it by such notions as having experience with the idiosyncracies of the machinery in a particular plant or the experience acquired by a team of workers who become more productive as they work together over time.

costs, there are fixed costs of hiring and training.¹

Up to this point, there is nothing new to distinguish Doeringer and Piore's analysis from human capital theory. Their argument is simple. The existence of enterprise specific skills makes on-the-job training the most efficient way of acquiring these skills. Stability of employment and reduction of turnover becomes then a desirable characteristic of personnel policies to enable employers recoup the costs of their investment in training.

Added to their skilled based theory of ILM is a non-economic concept: Custom.

Custom or customary law is the natural outgrowth of the psychological behaviour of stable groups. When stability of employment is encouraged a work group will begin to develop customs based upon precedent and repeated practice. As work rules become customary through repetition at the work place, they come to acquire an ethical or quasi-ethical status within the work group. Even when work rules may have initially reflected economic forces, custom imparts a rigidity to the rules and makes them difficult to change in response to dynamic economic forces. Custom seems to form more strongly around wage relationships and internal allocation procedures ... and is an important influence in the maintenance of ILM over time. 2

According to Doeringer and Piore, therefore, custom seems to reinforce the permanent employment relationship which was necessitated by specific skills and on-the-job training in the first place.

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1. This argument was first expounded by W. Oi, "Labour as a Quasi-Fixed Factor", Journal of Political Economy, December, 1962, pp. 538-555.
 2. Doeringer and Piore, op. cit., pp. 39-40.

The technology based creation of ILMs and the resulting dual labour market model (consisting of the primary segment (with ILMs) and the secondary with low paying and unstable jobs) that Doeringer and Piore proposed represent only one variant of segmentation theories.

A more radical (Marxist) position can be found in the writings of Gordon, Reich, Edwards, Carnoy and Carter.¹ They argue that the labour market segments are not necessitated by technology - they function as an efficient means of labour surplus extraction by the capitalist class. Segments, in effect, are a device concocted by the capitalists to divide the labour force, since each segment is primarily concerned with preserving or expanding its share of labour income and is less concerned with the overall share of labour in the national product.

Moreover, radical segmentation theorists argue that the human capital prescriptions to alleviate poverty and equalizing the income distribution by changing the educational (or training) characteristics of the labour force are bound to fail. Inequality will not be reduced unless more jobs are created in the primary segment, an event unlikely to occur under the capitalist form of

1. For a good exposition of segmentation theories see M. Carnoy, "On Segmented Labour Markets", in Education Work and Employment. UNESCO, IIEP, 1980. For a neoclassical critique of segmentation see G.G. Cain, "The Challenge of Segmented Labour Market Theories to Orthodox Theory", Journal of Economic Literature, December, 1976, pp. 1215-57.

production.¹

(b) A Critique

An analysis of the origins and functions of the ILMs that relies on a specific human capital approach (embellished with the non-economic concept of custom) tends to raise many logical and historical questions. Moreover, it overlooks some other factors responsible for the growth and maintenance of ILM structures.

(i) Historical problems. If it could be shown at some point in the past that the skills required by

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1. It is noteworthy that the segmentation theorists' prediction of the ineffectiveness of human capital variables in reducing the inequality of income, rests on the assumption of ever-growing numbers of people queuing up for "secondary" jobs. Under a static or even moderate growth of the labour force assumption, a change in the distribution of personal (human capital) characteristics may well have equalizing income effects. Suppose, for example, that after a substantial expansion of the education system, the inequality in the distribution of education has been greatly reduced. This will undoubtedly affect the occupational choice of people and result in growing numbers queuing up for good, "primary", jobs. This will tend to reduce the wages in the primary segment, while, at the same time, it will relieve the supply pressures in the "secondary" market and eventually raise the wage levels in that segment.

Thus, even if we accept the existence of segments in the labour market, human capital variables may indeed improve the distribution of income, provided, of course, that (a) there are no floods of poor immigrants queuing up in the "secondary" market and (b) population grows at moderate rates.

manufacturing became more enterprise specific (presumably as a result of a change in technology), then a sufficient condition for the appearance of ILMs would be established. However, it is not at all certain that machinery or technology were becoming more enterprise specific at the time of the formation of the ILMs in the industrialized world. It is true that mass production industry was developed in the early part of this century, which may have led to enterprise-specific technologies, as firms found it necessary to begin research departments and instal their own (or licensed import) machinery. At the very same time as these developments were occurring, however, capital goods industries were emerging and firms could purchase identical machinery from national or international vendors instead of having to craft their own as in the nineteenth century. There is reason to believe that this earlier lack of standardization across plants which characterised the nineteenth century led to enterprise-specific technologies as significant as those Doeringer and Piore have in mind. The growth of capital goods industries and the resultant use of standardized equipment underscores the importance of enterprise-specific skills in twentieth century manufacturing industry.

(ii) Logical problems. Setting aside the historical perspectives, the basic problem with the specific human capital approach to the ILMs is the paradoxical focus on training and skill as co-generators of the internal labour market. Right from the beginning of their book, Doeringer and Piore distinguish not only between specific and general¹ skills but between specific and general jobs and specific and general technology. Specific technology is assumed to give rise to enterprise specific skills which are contained in enterprise specific jobs. (A completely specific job is one which utilises only specific skills, in contrast to a completely general job all of whose skills are general). The first thing that comes to mind is to question the assumption that a change of technology gives rise to enterprise specific skills. Doeringer and Piore defend this assumption by the following argument:

A general principle appears to govern many technologies: the greater the variety of tasks a machine is built to perform, the less efficient it tends to be in the performance in any one of them. Since production departments are under continued pressure to

1. The terms "specific" and "general" have been borrowed from G.S. Becker who used them to describe two types of training. A discussion of training especially in the context of ILMs can be found in the next section.

minimize costs, the operation of this principle results in the tendency for technology to become increasingly enterprise specific over time. 1

It is rather surprising, however, that immediately afterwards, they concede that:

Countervailing pressure against specificity is generated by the savings in fixed capital costs and fixed labour costs associated with standardized equipment which can utilise widely available skills. Economies of scale in production generally make standardized equipment cheaper than custom-made machinery. The availability of standardized parts reduces repair and maintenance costs and the need for spare parts inventories. 2

According to Doeringer and Piore, however, the strength of the first argument³ seems to outweigh the importance of the second.

My impression is that technology may or may not lead to enterprise-specific skills, depending on the particular industry in question. In the automobile industry, for example, the introduction of automated equipment has de-emphasized skills on a widespread scale. Even if enterprise-specific skills were required under the new technology, (a) it is dubious whether the time involved in learning these skills, viewed by the employer as a cost,

1. Doeringer and Piore, op. cit., pp. 16-17.
2. Doeringer and Piore, op. cit., p. 17.
3. I am sure that many critics would also question the validity of the first argument. Is it necessarily true that the wider the applicability of a machine, the lower its efficiency in performing any given set of tasks ?

could have justified the much larger sunk costs entailed by the establishment of internal labour markets; (b) one would expect that job design would lead to reduced emphasis on enterprise-specific skills. A technology based on the interchangeability of workers cannot at the same time make them more indispensable.

Moreover, it seems that Doeringer and Piore believe that a change in technology leads to a fixed number of well defined jobs associated with enterprise-specific skills, largely independently of labour force supply characteristics.¹ The statement "Plants mould men to jobs, not jobs to men"² does not allow of any other explanation. I am amazed that, despite so many years of micro-micro research effort (to borrow a term established by H. Leibenstein in a recent issue of the Journal of Economic Literature), they have not realised that a job is not a fixed but a malleable concept. A job that someone is doing today may be different from the job that he is doing tomorrow, exactly in the same way as a kilogram of apples today is a completely different good from a kilogram of apples tomorrow. The phenomenon of job design and re-design, which is so common in most manufacturing enterprises, provides ample support of the following statement: "Plants

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1. M.J. Piore, "The Impact of the Labour Market upon the Design and Selection of Productive Techniques within the Manufacturing Plant", Quarterly Journal of Economics, November, 1968, pp. 602-620.
 2. Ibid., p. 619.

mould men to jobs and jobs to men".

In addition to the economic factors, Doeringer and Piore claim that custom plays a very important role in the formation and maintenance of ILMs. Surprisingly enough, though, they devote a disproportionately small portion of their book to explaining the relevance of this concept in their analysis. Their discussion of custom and its role in the origins of the ILMs is not integrated with the rest of their argument. Their point seems to be that custom exerts an independent force on the economic factors called into play by the specific human capital theory, and constrains the development of these internal structures in the direction of continuity with past practices.

Exactly how custom comes to bear in the process of internal labour market formation is never made clear. The best that can be said about the argument is that it has at least recognised non-economic factors which, though, remain unspecified.

(c) An alternative (or complementary) explanation

That the specific human capital explanation of ILMs of Doeringer and Piore had neglected some other important factors, was firstly emphasized by A.J. Alexander.¹ He found that both concentration (size) and

1. A.J. Alexander, "Income, Experience and Internal Labour Markets", Quarterly Journal of Economics, February, 1974, pp. 63-85.

capital intensity were significant determinants of "manorial structure".

Why should ILMs be associated more with bigger firms than smaller ones ? Are enterprise-specific skills more important to the big firm ? Do big firms enjoy economies of scale in providing on-the-job training ? Unfortunately, Doeringer and Piore do not seem to elaborate on these questions.

My feeling is that the importance of enterprise - specific skills and on-the-job training as the main factors leading to the development of the ILM concept has been over-estimated. Although there is no doubt that specific human capital might have played a part in the foundation of ILM structures, Alexander's finding points to the fact that stability of employment and the resultant ILM may be a feature of big (usually oligopolistic) firms quite independently of enterprise-specific skills and on-the-job training.

The massive increase in firm size (mainly due to economies of scale in production) that characterizes oligopolization implies a qualitative change in the prospects and problems confronting such firms. With the threat of ruinous competition over market shares reduced and the solvency of the firm reasonably assured, large firms can extend their time horizons and undertake long-run planning of future growth to ensure better utilization of their large capital investments. Such planning requires stability and control over input markets, including labour. As the size of the firm grows, increasing emphasis on stability implies

that maintenance and control of effort and loyalty assume paramount importance in personnel policies.¹ Widespread external recruitment and abuse of seniority provisions seem to interfere with the successful pursuit of these aims. The question then becomes: What is the size of firms which makes these organizational constraints imperative and necessitate the use of hierarchical job ladders?

In any case, the choice of hierarchical structures in personnel policies was not an event that occurred at random. As Ronald Dore has noted, the greater stability and likelihood of oligopolistic profits allowed for experimentation in personnel policies, "Planning of production allowed for planning of employment".² Implicit in this explanation of the ILMs is a recognition of the need to identify the constraints that firm structure imposes on the choice of personnel policies. The withdrawal of effort at the individual, group or firm level (as reflected, for example, by indiscipline, output restriction or strikes) becomes increasingly untenable as the size of the firm grows. The internal labour markets seem to provide the optimum environment for the control of work effort and loyalty. The incumbent employee, irrespective of enterprise specific skills, receives on-the-job training which probably

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1. The incidence of frequent rotation inside ILM structures seems to corroborate this argument.
 2. Ronald Dore, British Factory-Japanese Factory: The Origins of National Diversity in Industrial Relations. California: University of California Press, 1973.

increases identification with the firm and inculcates dependable work habits. The firm-trained skilled labour force is more likely to be loyal, stable and resistant to unions. I have never read or heard, for example, that the administrative and clerical personnel of the big multinational companies (with strong hierarchical structures) have been on strike.

Is, therefore, one entitled to say that the internal labour market is another device invented by the capitalists to divide and conquer the working class ? Bowles and Gintis,¹ co-authors of the famous book, Schooling in Capitalist America, would certainly agree.

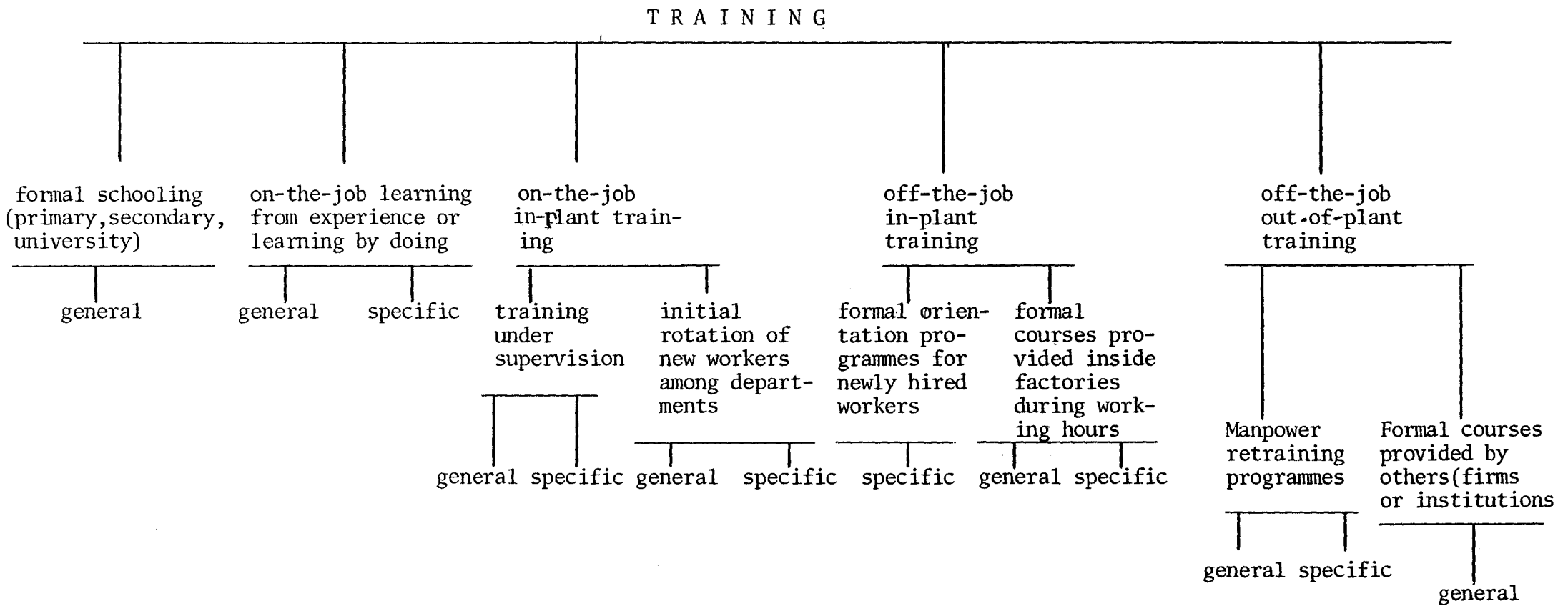
(d) Training, Internal Labour Markets and the Shape of the Age-Earnings Profiles

It appears that "training" is actually a somewhat vague term which has often given rise to a lot of confusion. It may comprise one or all of five things:² (a) Formal schooling; (b) on-the-job learning from experience some of which is unavoidable and hence does not constitute training; (c) on-the-job in-plant training, involving training under supervision or an initial rotation of new

1. S. Bowles and H. Gintis, Schooling in Capitalist America. New York: Basic Books, 1976.

2. Figure (4) provides a picture of the different kinds of training.

Figure 4: TYPES OF TRAINING



workers among departments; (d) off-the-job in-plant training, involving formal orientation programmes for newly hired workers or formal courses provided inside factories during working hours; (e) off-the-job out-of-plant training, including the government sponsored Manpower Re - Training Programs or formal courses provided by firms or institutions. Cutting across these types of training is Becker's distinction between "specific" and "general" training. According to Becker, specific training is defined as training that has no effect on the productivity of trainees that would be useful in other firms. Completely general training, on the other hand, increases the marginal productivity of trainees by exactly the same amount in the firms providing the training as in any other firms.¹ New firms, operating under competitive conditions, have no incentive to pay the costs of general training because they cannot ensure that they will be able to retain workers who have received training. This does not mean that general training will not be provided. What it does mean is that the costs of general training are passed on to trainees in the form of reduced earnings during the training period. In short, firms do not finance general training, they only provide it. Firms will bear the burden of training expenses only when the training is specific. Eventually,

1. G.S. Becker, Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education. New York: National Bureau of Economic Research, 1964, pp. 11-12, 18-19.

of course, workers pay for it anyway as the training expenses are recouped out of their increased productivity; nevertheless, specific training must raise earnings if the trained worker is to have^{an} incentive to stay on with the firm. Becker and Mincer¹ seem to argue that individuals are aware of this distinction between general and specific training and tend to invest in themselves after completing schooling by choosing occupations that promise general training; in so doing, they lower their starting salaries below alternative opportunities in exchange for higher future salaries as the training begins to pay off. This will give rise to age-earnings profiles that are initially convex from below as the worker is paying for all or a good part of the training by forgoing earnings; during the later years of his working life, he receives returns on his investment in training and hence the profile becomes concave from below. The steep rise in the age-earnings profiles after the training period has been vindicated by evidence for some forty countries around the world.

If, on the other hand, however, it is assumed that all training is specific, the firms have the incentive not only to provide but also to finance this kind of training. Sharing the costs of training implies (a) that earnings forgone during the training period will be much

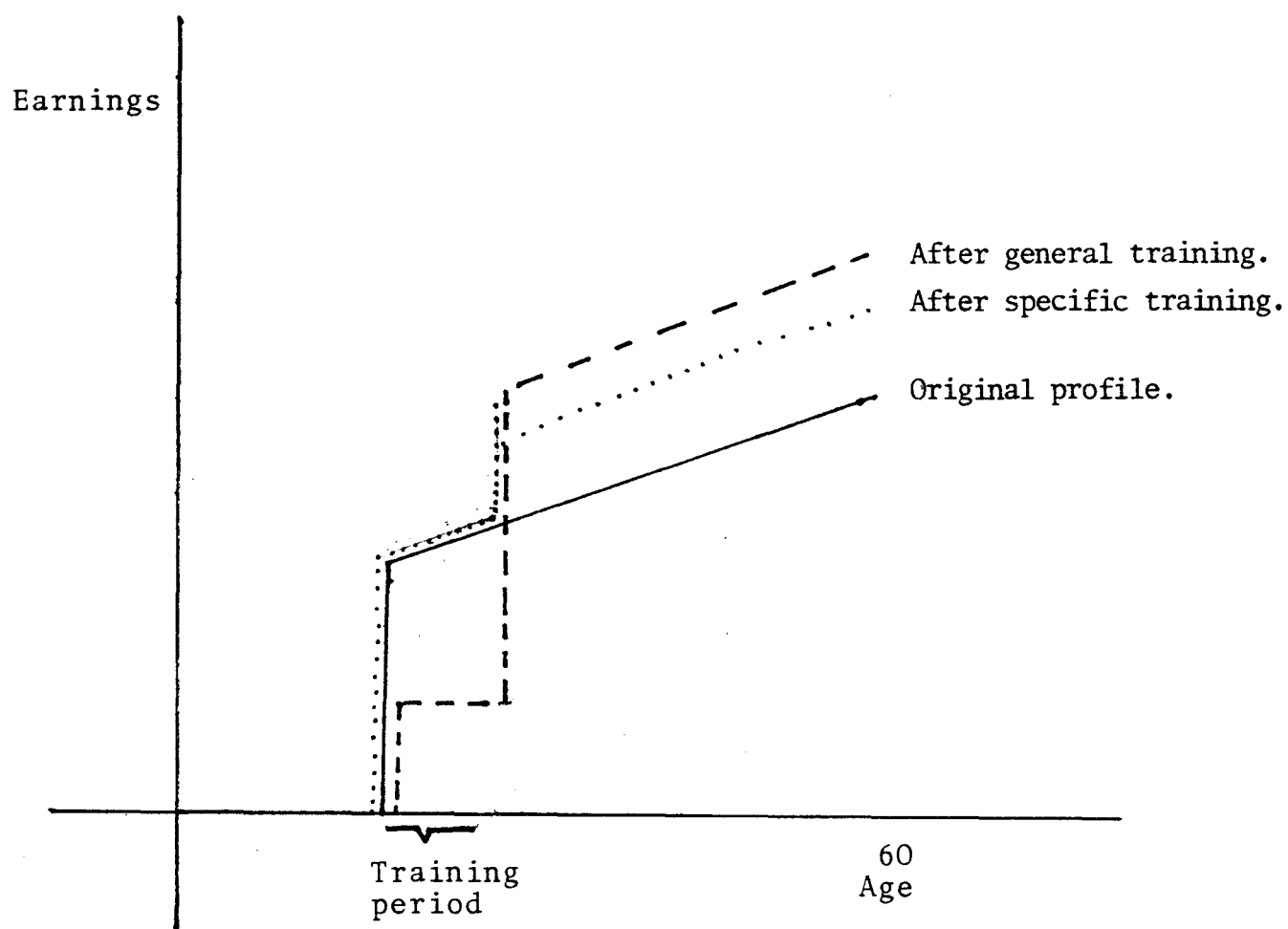
1. J. Mincer, Schooling, Experience and Earnings. New York: National Bureau of Economic Research, 1974.

less than in the case of general training. (b) The shape of the age-earnings profiles will be much flatter (as portrayed in Figure 5), since the employer knows that he can recoup the costs of training by paying later trained workers less than their improved marginal product.

In the presence of ILMs, where stability of employment and low turnover rates are the rule rather than the exception, the distinction between general and specific training, in terms of who finances the training (the employer or the employee), loses its meaning. If a firm were certain that a trainee would never leave, the question of the generality or specificity of training becomes irrelevant and the firm can behave as if all training were specific whatever its content¹ (i.e. bear the burden of the training costs). This proposition was expressed by Oatey² as a theorem: the higher the mobility of labour, the more training is general rather than specific, paid for in the first instance by workers rather than by firms.

Firms with ILMs, therefore, will tend to behave as if all training were specific, regardless of its content, giving rise to the prediction that the rise of the age - earnings profiles will not be particularly steep during the early years of the working life.

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1. It is interesting to note that Doeringer and Piore recognised this point in their book, albeit in a footnote. (p. 15, fn. 5).
 2. M. Oatey, "The Economics of Training with Respect to the Firm", British Journal of Industrial Relations, March, 1970, pp. 1-21.

Figure 5AGE EARNINGS PROFILES UNDER GENERAL AND SPECIFIC TRAINING

Setting aside the difficulties that general and specific training involve, the content of on-the-job training has not been sufficiently clarified by both Doeringer and Piore and human capital theorists. According to Doeringer and Piore:

On-the-job training is characterised by its informality. In many ways it appears either to occur automatically by "osmosis" as the worker observes others or repeatedly performs his job. 1

Their definition of on-the-job training (a) fails to distinguish between learning from experience (or learning by doing) and learning under supervision, and (b) fails to emphasize sufficiently that the former is costless² since it is a joint input in the production process while the latter is costly.

(e) Efficiency and Internal Labour Markets

The specific human capital approach that Doeringer and Piore basically adopted as an explanation of the ILM structure has lessened the criticisms and objections of neoclassical economists. Even recently, there has been an attempt by neoclassicists to interpret the ILM concept as an efficiency-oriented mode of organization necessitated by

1. Doeringer and Piore, op. cit., p. 39.

2. In principle, however, learning by experience cannot be assumed to be costless. So long as it is possible to compare the output of experienced and inexperienced workers in the same department, the costs of on-the-job training in the form of output forgone can be estimated.

the presence of transaction costs¹, generated by enterprise specific or idiosyncratic jobs and on-the-job training. The efficiency argument can be summarized in the following manner:²

Idiosyncratic jobs that require specific training, present a pervasive problem of bilateral monopoly. An important purpose of the internal labour market is to neutralize the issue so that it does not absorb the resources of the firm to the detriment of both workers and management. Accomplishing this aim involves minimizing bargaining and turnover costs; encouraging workers to exercise their specific knowledge; and ensuring that investment of idiosyncratic types, which constitute a source of job monopoly, are undertaken without risk of exploitation by either side. In ILMs, firms, by attaching wage rates to individual jobs and not to workers, reduce bargaining costs since they do not have to strike a deal with every single employee. (Jobs are filled by promoting meritorious workers through the organisational structure as they acquire

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1. Good examples of the growing literature on transaction costs can be found in O.E. Williamson, Markets and Hierarchies: Analysis and Anti-Trust Implications, New York: Free Press, 1975 and O.E. Williamson, "Transaction-Cost Economics: The Governance of Contractual Relations", Journal of Law and Economics", July, 1980, pp. 233-261.

For an interesting recent attempt to rationalize wage stickiness and the slow wage (price) adjustment (with long and variable lags) to exogenous disturbances, in terms of transaction costs involved in idiosyncratic exchange, see M.L. Wachter and O.E. Williamson, "Obligational Markets and the Mechanics of Inflation", The Bell Journal of Economics, Autumn, 1978, pp. 549-571.

2. This argument has been advanced by O.E. Williamson, M. L. Wachter and J.E. Harris, "Understanding the Employment Relations: The Analysis of Idiosyncratic Exchange", The Bell Journal of Economics, Spring, 1975, pp. 250-278.

training. High-wage jobs do not make high-wage workers; rather the internal labour market screens workers and places the good ones in good jobs.)

Using the jargon of the organizational failures framework, ILMs economize on the following set of factors that the incidence of bilateral monopoly (between employer and employee) generates.

(a) Opportunism and Small Numbers. By attaching wages to jobs rather than workers, ILMs reduce the small number bargaining indeterminacies that bilateral monopoly entails and curb potential opportunistic behaviour (i.e. self-interest plus strategic behaviour) by either of the parties involved.

(b) Uncertainty. Hierarchies economise on uncertainty since in the absence of it, sequential spot contracting would be the most efficient way of contracting .

(c) Bounded Rationality. Hierarchies economize also on bounded rationality. Unbounded or unlimited rationality would make contingent claims contracts the most efficient way of contracting. ILMs economize on the prohibitive transaction costs that contingent claims contracts entail under the assumption of bounded rationality.

The efficiency properties of ILMs, although elegantly rationalized in terms of transaction costs involved, rest on the assumption that jobs and skills are enterprise specific or idiosyncratic.

As was pointed out in section (c), however, the specific human capital approach is not an entirely convincing explanation of the ILMs. The size of firms seems to exert a much more telling influence on ILM formation. As the size

of the firm grows, increasing emphasis on control and stability over input markets, including labour, becomes the rule. The hierarchically organised ILMs may well then provide the necessary environment for controlling work effort and eliciting workers' loyalty.

Associated with the efficiency aspects of ILM structures another important question crops up with important implications for employment creation and manpower policy. Are good jobs (internal labour market jobs) scarce, relative to a Pareto optimum? It is not only the proponents of the dual labour market, but many neoclassicists as well, who provide an affirmative answer to this question. M. Wachter, for example, claims that market power (whether in unions or oligopolies) results in a socially inefficient undersupply of good jobs.¹ High wages that are not offset by savings in turnover costs, reduce the output in hierarchically organised labour structures (and hence the derived demand for good jobs) and generate a substitution toward capital and away from labour.

Contrary to the view that internal labour market jobs are scarce relative to a Pareto-Optimum, run two arguments that have been advanced by Rawlins and Ulman.² According

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1. M.L. Wachter, "Primary and Secondary Labour Markets: a Critique of the Dual Approach", Brookings Papers on Economic Activity, August 1974, pp. 634-680.
 2. V.L. Rawlins and L. Ulman, "The Utilization of College Trained Manpower in the U.S.", in M.S. Gordon, Higher Education and the Labour Market. New York: McGraw-Hill, 1974.

to the first, the smooth functioning of departmental operations may induce decision-makers to operate with enough manpower slack to handle emergencies in their stride.

This slack may include more employees than is necessary for everyday operations. The appearance of waste must always be avoided; but real cost-cutting, especially in the area of manpower, may run counter to the requirements of contingency planning. In cases where the firm experiences extreme financial pressure, the cost-minimizing objective may take precedence, and occasional performance failures are written off as evidence that department managers are operating with lean staffs in the overall interest of the firm. In normal times, however, performance is the standard criterion for success and the wise department head will accumulate some manpower slack as insurance. This will even allow some room for cutbacks in a financial crisis without seriously affecting performance. 1

According to the second argument, ILMs may contribute to a situation in which there are more educated employees than may superficially appear optimal. Tough competition among a pool of high potential workers serves to raise their motivation and work effort. Additionally, it provides an easier task for management to screen the best employees to the top positions of the hierarchical structure.

To corroborate their argument, the authors cite some strong evidence that during periods of recession, firms made drastic cut-backs in the recruitment of college graduates and even lay-offs without proportionate decreases in production.

1. Rawlins and Ulman, op. cit., p. 217.

Present-day governments of many countries seem to devote increasing attention and resources to employment creation programmes. There are many economists who believe that small or medium-sized firms do create more jobs than bigger ones and, therefore, urge government policy to encourage and support them. Evidence that big firms usually do have some fat to trim indicates that the issue has not been resolved. Big firms (with ILMs) may well fare better in providing jobs that governments are hotly after. Support for the big ones, though, (no matter how rational this support may be) is likely to entail an unbearable political cost which many governments are not prepared to take.

(f) Wage Determination in ILMs

In their discussion of wage determination inside ILMs, Doeringer and Piore acknowledge the influence of neoclassical wage theory.¹ They argue, however, that the forces, which in neoclassical theory yield a determinate wage, establish, in the internal market, only a series of constraints.² The indeterminacy of wages is further complicated

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1. They stress the role of such factors as community wage surveys, individual merit ratings and job evaluation schemes, which are clearly determined by competitive forces.
 2. It is interesting that they even concede that, with some modification, the competitive market model could encompass much of the phenomena of the internal market, at least on long-run assumptions. They have deliberately avoided such an effort though, since to have done so, they argue, would have been "understood as a departure from some optimal set of arrangements". Doeringer and Piore, op. cit., p. 7,

by another set of constraints representing, they argue, internal allocative, social and institutional forces. In the subsection which follows, the neoclassical constraints that Doeringer and Piore had in mind will be discussed, whilst in the subsequent subsection another set of constraints emanating from the organisational imperatives of big corporations will be analysed.

(i) Neoclassical Constraints

The central results of neoclassical theory are two-fold. First, an enterprise will pay each employee a wage commensurate with what he could obtain elsewhere. Second, the wage will be equal to the worker's marginal product. These results are dependent upon two assumptions seldom made explicit in the development of the theory: the absence of fixed labour costs and the temporary nature of the employment relationship. Both assumptions are generally abrogated by the internal labour market. Internal markets tend to be accompanied by significant fixed costs of recruitment, screening and training, and are designed to create a permanent relationship between the worker and the enterprise.

Because fixed costs of recruitment, screening and training occur in ILMs, wages (a variable cost) are no longer the sole component of labour costs, nor are they the single variable controlling labour allocation. The existence of fixed non-wage costs implies (a) that the equality between wages and productivity will no longer hold.¹ The

1. It is interesting to note that Becker in his seminal book "Human Capital" op. cit., acknowledged that the provision of general training by employers abrogates the equality between wages and marginal products.

marginal product of labour in the internal market must be sufficient not only to compensate the employer for wage costs, but also for non-wage expenditures on hiring and training; (b) employers will encourage a permanent employment relationship with their work force to recoup their investment in training. The incentive to reduce turnover no longer compels the profit-maximising firm to equate the wage and marginal product of labour in every pay period. Employers should be willing to pay a wage greater than the marginal product in early periods, provided they are compensated by marginal product in excess of wages in some subsequent period.

The permanent employment relationship has startling implication for neoclassical wage theory. When the relationship is permanent, neither workers nor employers necessarily concern themselves with the connection between wages and marginal productivity at any point in time.

There is instead a much more liberal, but nonetheless competitive constraint that relates labour costs, earnings and productivity streams over the employee's entire work career within the enterprise. As a result, there is a set of internal wage structures consistent with this constraint. Where the worker typically holds a number of different jobs over the course of his employment life within the enterprise, this constraint implies little or nothing about the wage on any particular job. The disruption of the neoclassical equivalencies between the wage and the marginal product in each pay period, in other words, involves the disruption of these equivalencies for a given job as well. The worker, therefore, may never produce enough in a particular job classification to cover his wages during the period in which he is employed in that

classification.¹

Finally, Doeringer and Piore argue that wage and employment decisions apply to groups of workers² rather than to individuals.

When wage determinations are made for groups of workers the influence of economic constraints - labour costs, productivity and so forth - is estimated in terms of the expected value for the group as a whole and not for the individual. As a result, the productivity of some workers drawn from any particular group is likely to differ from the expected value of the group. Some will therefore receive wages below their individual productivity and some will receive wages above it. Thus, a worker who produces more quickly than average seldom reaps the full gain, but rather he subsidises the worker who produces less than average. Similarly, the worker who stays with an employer longer than average tends to subsidise the fixed employment costs of workers who stay for less time. ³

To sum up, in ILMs the existence of fixed labour costs and the permanent employment relationship imply that the equality between the marginal product of labour and the wage of a job postulated by neoclassical theory is reduced to an equality between the discounted present value of expected costs and productivity streams calculated over the distribution of expected employment tenure for various groups within the enterprise. Such constraints are

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1. Doeringer and Piore, op. cit., p. 76. It is rather strange that Doeringer and Piore after recognising that workers on the same job may receive different remuneration, insist, subsequently, that in the ILM, wage rates are attached to jobs and not to workers.
 2. The group may be defined by characteristics such as age, race or education or by seniority and job classification.
 3. Doeringer and Piore, op. cit., p. 77.

consistent with a variety of different wages for any particular job and a variety of internal wage structures as well. Furthermore, the other important neoclassical wage determinant, the wage on alternative employment opportunities, is also not a binding constraint. The employer can meet competitive pressure upon his wages through compensating adjustments in recruitment, screening and training. Competitive market pressures upon the wage structure are felt almost entirely at entry-level jobs.

In addition to the neoclassical constraints, Doeringer and Piore mention the importance of social and institutional constraints in the wage determination process. How these constraints interrelate with the neoclassical constraints is not clarified. All that they say is that these constraints exert added pressure on the indeterminacy of wages.

The confusion that these added constraints create is best demonstrated by the following example. Suppose that an oversupply of workers develops at entry level jobs in a particular ILM job cluster. According to Doeringer and Piore the wage for these entry level jobs will not remain fixed but will fall. Is the cohort which entered the market at reduced wages going to catch up with the previous cohort which entered at higher wages or is there going to be a permanent "cohort effect" ? Unfortunately, their analysis is not capable of answering such a disturbing question. If there is a tendency for firms to promote individuals by seniority along well-defined job

ladders and to raise pay through "standard" increases over starting rates, there will be a "cohort effect" and the evidence cited by Freeman¹ seems to corroborate this argument. Doeringer and Piore's wage determination analysis seems able to explain both a "permanent cohort effect" and a "catching up" for those entering the firm at lower wages because of over-supply. The forces of custom will reinforce the "catching up" argument whilst the "neo-classical constraints" would lend support to a "permanent cohort effect". One is left to wonder whether efficiency or inefficiency will tend to predominate.

(ii) Organisational Constraints

It was argued in previous sections that the presence of ILM structures can better be explained by the organizational imperatives that increasing firm size has necessitated. As the size of the firm grows, maintenance and control of workers' effort and loyalty assume paramount importance in personnel policies. On-the-job training may then be used by the firm as a means to increase workers' identification with the firm and to inculcate dependable work habits like loyalty and resistance to unions. If one adheres to this explanation, it would be logical to expect that firms with ILM structures should have a tendency to offer a premium to secure a steady flow of labour services quite apart from the neoclassical constraints

1. R. Freeman, "The Effect of Demographic Factors on Age - Earnings Profiles", Journal of Human Resources, Summer 1979, pp. 289-318.

mentioned before. This premium will tend to differ among employers since (a) they are expected to have different attitudes towards risk, and (b) they attach different subjective probabilities to discontinuities in the smooth and steady flow of labour services.

Evidence, although indirect, that large firms (with ILMs) do indeed pay a premium to secure stability of employment was provided in the U.K. by the Bolton Committee on Small Firms¹, which estimated the difference in earnings between employees of small and large firms to be 20% and which also found that this difference was mainly due to lower wage rates of similar jobs with only a small part of the difference explained by the incidence of shift work, part-time work and overtime payments.

In general then, the competitive market does not determine any individual rate within the firm (except for an entry job that is not part of a promotion ladder).² Even so, firms cannot set their relative wages arbitrarily. As the literature on job evaluation schemes emphasizes, they are designed to advance intrafirm efficiency. For example, the wage structure attaches sufficient wage increases to promotions to provide sufficient motivation to

1. The Report of the Bolton Committee of Inquiry on Small Firms. London: HMSO, 1971.

2. Even that statement can be disputed since a firm with a reputation for good promotion possibilities could pay a lower entry wage. The insatiable demand for civil service jobs might be a good example of this possibility.

employees to seek after them. Authority relationships are cemented by paying a worker more than those he supervises. As Meij summarizes, "the internal wage-structure is the value dimension of the organization structure".¹

In general, one can expect to find different pay structures within internal job clusters for the following reasons:

- (a) Different employers attach different premiums to stability of employment and control of work effort and loyalty;
- (b) The job content of identically classified jobs in different firms might be different since job design is continuously changing the nature of the job content. It is obvious, therefore, that wages attached to these "jobs" will tend to differ.
- (c) The job ladder among firms might be of a different nature. For example, the number of promotion steps might vary from firm to firm.

(3) Criteria for Establishing the Existence of ILMs

Doeringer and Piore do not lay down vigorous criteria for the identification of ILMs.

1. J.L. Meij, "Wage Structure and Organisation Structure", in J.L. Meij (ed.), Internal Wage Structure. Amsterdam: North Holland, 1963, p. 115.

Mace¹ argues that since ILMs are the result of forces that do not give rise to a unique set of precisely quantifiable consequences in firms, no single statistic is sufficient to establish the existence of an ILM. I share his view that a collection of characteristics occurring together is necessary to establish the existence of ILMs. And, though he says that

the investigation of this concept (ILM) may require the small sample social surveys usually undertaken by sociologists rather than the large sample, statistic and techniques currently favoured by most economists, ²

I will attempt to show that even regression analysis, the bread and butter of economists, might prove to be helpful.

The first thing to remember is that in order to test for the presence of ILMs, the associated job cluster has to be identified. When Mace is providing evidence for the existence of ILMs among engineers, I am not sure whether he is aware that an engineer with a university qualification and an engineer with some other lower level technical education might not belong to the same internal labour market (e.g. a university graduate may work in the research department, while an engineer with some lower technical qualifications may be directly employed in production). My experience from Greek industry shows that this may well be the case.

1. J. Mace, "Internal Labour Markets for Engineers in British Industry", British Journal of Industrial Relations, March, 1979, pp. 50.63.

2. Ibid., p.51.

Be that as it may, I consider the following necessary criteria for proving the existence of ILMs:

(a) Turnover

Turnover is expected to be low in the presence of ILMs. Alexander¹, in his QJE article, measures turnover as the proportion of workers who left their firms between the first quarter of 1965 and the first quarter of 1966 and he selects an arbitrary 10% figure as an indication of ILM structure. Mace argues that the turnover statistic should be E/V where E = external recruitment and V = all vacancies arising within the firm. But if a firm is expanding, say, and the majority of employees are recruited at entry level jobs, then the ratio E/V will be biased upwards. I do think that, ideally, the turnover rate should not include retirees. It should include the proportion of employees under 60 who left the firm between two points in time (say, one year). Even if the firm is contracting, this will not seriously bias the turnover rate since the firm can actually contract without recruiting or firing, simply by letting people who reach retirement age to leave the firm.

Although turnover rates, on their own, may be an insufficient criterion, I do think that the arbitrary 10% used by both Alexander and Mace can be legitimately applied as one, but only one, measure of ILM structure.

1. Alexander, op. cit., p. 67

A supplementary criterion to the turnover rate might be considered to be the proportion of employees who have been with the firm all their working lives, i.e. proportion of employees without previous work experience.

(b) Entry Ports, Promotion Ladders and Salary Structure

In firms with strong ILMs, vacancies that occur at senior levels will be reserved for those already employed in the firm. Entry will usually take place at the bottom of the job ladder, since a vacancy near the apex of the hierarchy will be filled by internal promotion and consequently be shifted downwards to the base. The following criteria may then be employed:¹

- (i) Since recruitment typically takes place at younger ages, there should be a significant difference between the average age at entry and the average age of the work force. Alternatively, one can calculate the proportion of the work force recruited under the age of 25.
- (ii) There should be a significant difference between the level of responsibility at entry and the average level of responsibility of existing job incumbents.
- (iii) One can also calculate for, say, a two-year period,

1. Some, but not all of them, have been developed by Mace.

the proportion of newly recruited employees appointed at the lower levels of job responsibility.

- (iv) Years of in-firm experience should be the most important determinant of salaries inside an internal labour market. One should therefore expect that R^2 in simple OLS regression of earnings against in-firm experience, will be high. Both seniority and ability play a part in wage determination inside the firm. Very high R^2 in a simple regression of earnings against in-firm experience imply that more emphasis is laid on seniority and less on ability. Strong emphasis on seniority is of course a salient characteristic of ILMs.
- (v) Since entry typically takes place at younger ages and entrants are not expected to have any previous work experience, the correlation coefficient between age and in-firm experience is expected to be high.
- (vi) Even when the new entrant has some form of previous experience (either related or unrelated to the present job), in the presence of ILM structures, one should expect that when in-firm experience and previous experience are entered separately in an earnings function regression model, the coefficient of previous experience will generally be expected to be insignificant. Even when it is

significant, one can use a t-test to test the equality of in-firm and out-firm coefficients. An extra year of in-firm experience is expected to be more important than an extra year of out-firm experience.

- (vii) In the wage determination process, competitive forces are felt at entry level jobs, at the base of the ladder. Once inside the ILM, wage determination abstracts from external market forces and different firms are expected to have different pay structures for the same job clusters.

One should therefore expect that average entry level salaries for the same job cluster (at the lower level of the job ladder) should not be significantly different among firms, although they are generally expected to have different overall pay structures. In order to prove that the pay structure is different among firms, one can employ a Chow test.¹ A simple earnings function regression model involving experience and education can be fitted separately to the data for each firm, and the Chow test can then be used to test the equality of the coefficients in the two separate regressions by means of an F-test. If equality cannot be assumed there is evidence that pay structures, for the same job cluster, are different among firms.

1. D.G.C. Chow, "Tests of Equality Between Sets of Coefficients in Two Linear Regressions", Econometrica, July, 1960, pp. 591-605.

(c) Adjustment Mechanisms

According to Doeringer and Piore, there are two adjustment instruments available to firms, the "constrained" and the "less constrained". The "constrained" instruments are those suggested by competitive theory and include altering the wage or job structure. Such instruments are not frequently used by firms with ILMs. They will, therefore, tend to use more of "less constrained" instruments, such as job re-design, sub-contracting, allowing for vacancy levels to rise (especially at lower levels), increasing overtime, widening recruitment and screening procedures, curtailing production and re-training.

If ILM structures exist, adjustment is expected to take place mainly through the "less constrained" instruments. This is, of course, a relative, rather than an absolute, criterion of ILM structures.

(d) Training

One characteristic of ILM structures is the formalized provision of on-the-job training. It is not possible to formulate the training criterion precisely. In all firms, with or without ILM structures, there is some sort of on-the-job training, either formal or informal. Provision of formal training is at least indicative of ILMs, but it does not follow that formal training is a necessary condition for the existence of ILM structures.

(4) Some Evidence on the Existence of ILMs in Greece

(The Clerical Job Cluster)

In this part of the essay, the criteria that have been developed in the previous section will be applied to the data collected from the personnel records and personal interviews with the Personnel Managers of four big Greek corporations.¹ (These firms included a banking firm, a bauxite extraction firm, a cement firm and a textiles firm). As mentioned before, ILM structures have to be linked with specific job clusters. In this section, the clerical job cluster will be considered. The clerical job cluster includes the majority of white-collar employees with the exception of managerial, sales, security and cleaning staff. It includes accountants, bookkeepers, secretaries, etc. The occupational title given by the firms for most of them was "office employee".

For the Banking Corporation (Firm 1), there were 9375 observations, for the textile firm (Firm 2) there were 129 observations, for the bauxite extraction firm (Firm 3) there were 171 observations and for the cement company (Firm 4), there were 143 observations. With the exception of the textile company, for which a random 20% sample was selected, the

1. The four firms are the "National Bank of Greece", "Voxitae Parnassou", "Tsimenta Chalcidos" and "Piraiki-Patraiki". I am indebted to these organisations for the provision of these data. The data were collected in 1978 and 1979.

remaining three firms provided data for all their "clerical" employees.

(i) Turnover

The turnover rate was calculated as the proportion of employees under 65 for men and under 60 for women who left the firm in the one-year period preceding the day of the interview. For all four firms, the turnover rate was found to be less than 10%.

Furthermore, the proportion of employees with no previous experience was as follows:

<u>Firm 1</u>	<u>Firm 2</u>	<u>Firm 3</u>	<u>Firm 4</u>
93.5%	90.3%	84.7%	80.2%

It should also be noted that the bigger the firm, the lower the turnover rate recorded. (Size was approximated by the number of people employed). These findings corroborate A. Alexander's point that turnover rates are related to size.

(ii) Entry Ports, Promotion Ladders and Salaries

Age at entry was computed from the data supplied by the four firms. A t-test showed that the difference between age at entry and age at present was significant at the 0.05 level for all firms. In firm (1), 80.1% were recruited under the age of 30, in firm (2) 83%, in firm (3)

73.8% and in firm (4) 69.5%. From the interviews with the Personnel Managers, I learned that in all firms, over 90% of new recruits, over the past two years, were appointed to the lower levels of job responsibility. The stated policy of all firms was to recruit people below the age of thirty and reserve senior posts for the incumbent employees.

Within ILMs, the correlation coefficient between experience and age is expected to be high since entry is taking place at younger ages. The correlation coefficient is found to be between 0.65 and 0.80 for all firms. Partitioning the samples by sex shows that for females the correlation coefficient between age and experience is much higher than males. The probable reason is that the majority of women in Greece enter the labour force in their early twenties, while men are expected to enter the labour force over a much wider time period (usually between the ages of twenty and thirty).

From Table 15, it can be seen that years of in-firm experience on its own explains more than 50% of the variance of ln monthly earnings. As noted before, high R^2 can at least be considered as partial indicators of ILM structures.

In Table 16, experience² was added into the regression.

In Table 17, education (in continuous form), previous experience and its square were added to in-firm experience and its square. For two firms, the coefficient

TABLE 15 : REGRESSION OF LOG MONTHLY EARNINGS ON
EXPERIENCE

	Firm (1)	Firm (2)	Firm (3)	Firm (4)
NEXP	.0423 (.0003)	.078 (.0002)	.041 (.004)	.039 (.005)
Constant	9.876 (.005)	9.567 (.004)	9.254 (.044)	9.408 (.037)
R ²	.62	.71	.56	.51
Number of Cases	9405	129	171	143

Notes: NEXP = years of in-firm experience.
Values in parentheses are standard errors.
All coefficients are significant at the 1% level.

TABLE 16: REGRESSION OF LOG MONTHLY EARNINGS ON
EXPERIENCE AND EXPERIENCE²

	Firm (1)	Firm (2)	Firm (3)	Firm (4)
NEXP	.067 (.001)	.082 (.003)	.051 (.016)	.057 (.016)
NEXP ²	-.0008** (.0005)	.002 (.0001)	-.0006* (.0005)	-.001* (.001)
Constant	9.771 (.006)	9.382 (.005)	9.392 (.087)	9.358 (.058)
R ²	.64	.75	.58	.52

Notes: * Coefficient insignificant at both 5% and 1% level.
** Significant at 5% level but not at 1% level.

TABLE 17: REGRESSION OF LOG MONTHLY EARNINGS ON
EDUCATION, EXPERIENCE, EXPERIENCE²,
PREVIOUS EXPERIENCE AND PREVIOUS EXPERIENCE²

	Firm (1)	Firm (2)	Firm (3)	Firm (4)
EDUC	.024 (.001)	.073 (.018)	.060 (.012)	.046 (0.153)
NEXP	.068 (.001)	.056 (.012)	.044 (.014)	.065 (.013)
NEXP ²	-.0008* (.0006)	-.002* (.0002)	-.0003* (.0004)	-.001* (.0007)
PEXP	.023 (.007)	.016* (.014)	.022* (.016)	.032 (.023)
PEXP ²	.0003* (.0002)	-.0001* (.0005)	-.0001* (.0007)	.0002* (.002)
Constant	9.235 (.015)	9.082 (.075)	8.623 (.176)	9.309 (.150)
R ²	.062	.78	.59	.725

Notes: * Coefficient not significant at both 5% and 1% level.

NEXP = years of in-firm experience

PEXP = years of previous experience

EDUC = years of schooling completed

of previous experience was found insignificant. In the remaining two firms, where it was significant, a t-test showed that the coefficient of previous experience could not be accepted as being equal to the coefficient of in-firm experience. The findings again comply with the criterion that in the presence of ILM structures, previous experience is either insignificant or less important than in-firm experience in determining earnings.

Firms with ILMs are also expected to have different pay structures. A Chow test was performed for all possible pairwise combinations of regressions presented in Table 17 and the null hypothesis of equality of coefficients could not be accepted at both the 5% and 1% level. Thus the hypothesis that the firms have similar pay structures can be rejected.

When the average salary of new entrants (employees recruited during the year preceding the date of the interview) was computed, a striking similarity was found, corroborating the argument that competitive forces are mainly felt at entry ports.

(ii) Adjustment Mechanisms and Training

All Personnel Managers admitted that in the face of an expansion or contraction of the firms' activities vacancies rose or fell only at the lower levels of job responsibility. They also stressed the incidence of job re-design, re-training, and overtime payments. Changes in

the salary structure were not considered to be important instruments of the firms' policy in the event of expansion or contraction. Again, the qualitative criterion that in ILM structures, "less constrained" instruments are the rule rather than the exception, was corroborated.

(5) Internal Labour Markets, the Bumping Model of the Labour Market and Educational Demand

The early seventies saw the development of two very similar models of the labour market - the Job Competition and the Bumping models, associated with the names of Lester Thurow¹ and Gary Fields² respectively.

As Barth³ has noted, the basic contribution of Thurow's Job Competition model is the imposition of the labour queue at the entry ports of internal labour markets.⁴ As contrasted with a "wage competition" model in which workers compete with each other for jobs by altering the

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1. L. Thurow, "Measuring the Economic Benefits of Education", in M.S. Gordon (ed.), Higher Education and the Labour Market. New York: McGraw-Hill, 1974.
 2. G. Fields, "The Private Demand for Education in Less Developed Countries", Economic Journal, December, 1974, pp. 906-925.
 3. M. Barth, "Generating Inequality: A Review Article", Journal of Human Resources, Winter, 1977, pp. 92-102.
 4. In other words, the presence of strong internal labour markets is a necessary but not sufficient condition for the operation of the Job Competition model.

wage rates for which they will work, in a "job competition" world, individuals compete for places in a labour queue. The ranking in the queue is based upon training costs, which employers attempt to minimize. Employers have only imperfect knowledge of what the training costs for any particular employee may be, so they must use one or more screens or rules-of-thumb. These rules-of-thumb necessarily rest on the obviously discernible characteristics of workers. As a result, workers are ranked in the labour queue according to background characteristics. Once the worker is in a background-characteristic class, according to this theory, selection for a job is essentially by lottery. (While Thurow suggests there are many background characteristics, when using the model he almost always employs education as the sole screen). All training is acquired on the job; the labour market is thus a market for training slots.

Training opportunities occur when there is a job opportunity that creates a demand for the skill in question. That is, the demand for labour creates its own supply. In a diagram of the model in the wage quantity space, the supply curve for trained labour coincides with the demand curve for trained labour (above some opportunity wage, the determination of which is not discussed). That is, there is no supply of trained labour unless some particular skill is demanded. The wage is given to the firm exogenously, and the intersection of the horizontal wage line with the supply -

demand curve determines the quantity employed.

There exists at any time a distribution of job opportunities that depends on technology, the sociology of wage determination (for example, Dunlopian wage contours) and the distribution of training costs - that is, the shape of the labour queue. The labour queue and the job distribution somehow interact to allocate workers to training slots. From there, the internal labour market takes over to determine a lifetime earnings stream.

Thurow's basic purpose in developing his model was to show that social rates of return, as conventionally calculated, could be misleading indicators of the economic payoffs of education. He argues that a Job Competition model shifts the emphasis on who bears training costs, the distribution of training costs across job opportunities and the elasticities of training costs with respect to education.

Fields' purpose in developing his model was a different one. The scope of the Bumping model was to provide a rational economic explanation for the sustained high demand for education in less developed countries, despite educated unemployment and under-employment. In brief, Fields assumes that there are two jobs in the economy, the skilled and the unskilled job respectively. Each job commands a fixed wage. (Fields does not seem to discuss the importance of ILMs for his model but it can easily be incorporated in the analysis.) Associated with each job

there is a labour queue and the rank order in the labour queue is determined by two levels of education, the "educated" and the "uneducated". In the skilled job only educated people are hired. In the unskilled, education is a desirable but not an essential characteristic, i.e. employers, when faced with a choice, prefer a university graduate to a high school graduate.

One can easily see the similarities of the two models. The existence of the labour queue, the importance of education in determining the rank order in the labour queue and the exogeneity of wages.

Based on Fields' model, it will be attempted to present a slightly modified model to take account of my analysis of the labour market in less developed countries. Suppose there are two job clusters (or families)¹, each of them associated with strong internal labour markets. (Entry typically takes place at the bottom of the job ladder and seniority provisions largely determine the life-time earnings stream). The first is named "managerial" and the second "clerical". The first contains jobs whose technical focus is management and the second contains jobs whose focus is clerical work. For simplicity, there are only two levels of education involved. High school and university. Jobs in the managerial cluster can only be filled by university graduates. In the clerical cluster, higher education

1. The concept of job clusters associated with the names of Dunlop and Scoville was discussed in the ILM section.

is a desirable but not an essential qualification. In the clerical cluster, when the employer is faced with a choice between a university and a high school graduate, it is assumed that he prefers to hire the university graduate. Preferential hiring may take place for a host of reasons, the most important being that possession of university degree conveys the information that the holder is expected to be more trainable than a high school graduate. (Fields mentions another two reasons for preferential hiring:

(a) employers do prefer for economic reasons to associate with the better educated, or (b) the educated elite seek to legitimize their own position at the top of the pecking order by using the "objective" criterion of educational attainment to exclude others.) It is further assumed that the fixed wage for entry level jobs in the managerial cluster is higher than the corresponding wage for the clerical cluster. University holders prefer the managerial cluster because it offers higher expected present value earnings ($PV_{\text{managerial}} > PV_{\text{clerical}}$).

When the number of university graduates falls short of the number of managerial level jobs available, expected PV for the managerial job cluster will remain unchanged if another person receives a university degree. Once the educational system has produced more than enough university graduates to fill all managerial jobs for which hiring is taking place, however, each of them must expect to be unemployed part of the time. The expected present value for managerial jobs will fall, but so long as the expected

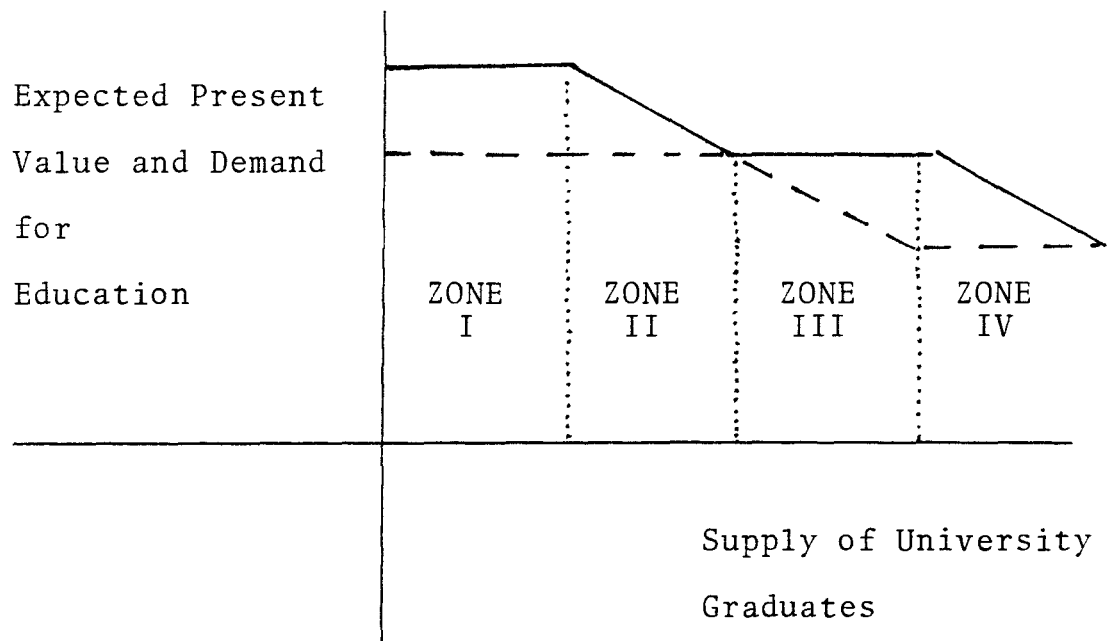
PV for managerial jobs > expected PV for clerical jobs, university graduates will choose to enter the managerial labour market despite the likelihood of some unemployment, in preference to full-time employment at a lower wage in the clerical sector. After some point there will be sufficient unemployment, so that the expected PV for managerial jobs will be driven down and equal the expected PV for clerical jobs. At this point it becomes profitable for university graduates to enter the clerical job queue and bump high school graduates from the clerical jobs. Some high school graduates are, therefore, forced to leave the clerical jobs and select another job cluster with a lower expected present value. So long as university degree holders are able to bump high school graduates from the clerical jobs, the expected PV for managerial jobs will continue to equal the expected PV for clerical jobs despite increases in the number of university educated people. Hence, the demand for higher education, which is a function of the expected PV ($D = f(PV)$), will remain constant despite increases in the number of university graduates. After some point all clerical jobs will have been filled by university graduates and they will then start competing with each other for both managerial and clerical jobs. High school graduates will be effectively excluded from breaking into the clerical job cluster. When the number of university qualified job seekers exceeds the number of both managerial and clerical jobs available, expected PV for both

clusters will fall and hence the demand for higher education will be curtailed.

The above analysis can be presented in Figure (6). In the first zone, expected PV for university graduates and hence demand for university graduates is constant since the number of university graduates is less than the number of managerial jobs available. In the second zone, despite the fact that all managerial jobs are filled, university graduates prefer to remain unemployed because expected PV for managerial jobs $>$ expected PV for clerical jobs. In the third zone, bumping takes place and expected PV for managerial jobs equals the expected PV for clerical jobs. So long as university graduates are bumping out high school graduates from the clerical jobs, the expected PV and hence the demand for higher education will remain constant despite increases in the number of university degree holders. In the fourth zone, all jobs in both clusters are filled by university graduates. Unemployment will start to appear among them and hence the expected present value and the demand for education will eventually fall.

The important contribution of the model is that when Zone III is in operation and bumping takes place, the demand for higher education will remain constant despite increases in the number of university educated people. The private rate of return and hence the demand for higher education might even increase in Zone III if the expected present value for high school graduates drops drastically.

FIGURE 6: THE RELATION BETWEEN EXPECTED PRESENT
VALUE AND THE SUPPLY OF UNIVERSITY
GRADUATES



Notes: The continuous line depicts the expected PV for university graduates and the demand for university education as the supply of university graduates increases. The discontinuous line depicts the expected PV for secondary graduates as the supply of university graduates increases.

Thus, in order to prove the existence of bumping in particular job clusters of the economy, the following steps have to be taken:-

- (a) Assuming that there are two educational levels¹ in the economy, identify:
 - (i) A job cluster that only employs persons from the higher educational levels;
 - (ii) Another job cluster which employs people with both educational levels. Employers, though, when faced with a choice are assumed to prefer people with higher educational qualifications.
- (b) Using the criteria analysed in the previous section, prove that there are strong internal markets associated with these clusters;
- (c) Study the recruiting policies of firms with these job clusters in common, over time.

If the proportion of university graduates recruited in the job cluster that employs people with both educational levels increases over time, there is strong evidence that bumping is taking place and hence the demand for higher education is unlikely to fall.

1. The analysis can be easily extended to include more than two educational levels.

(6) Some Tentative Evidence of Bumping in the Greek Labour Market

The data collected from the personnel records of four big Corporations in Greece¹ allowed the identification of two job clusters, the "managerial" job cluster and the "clerical" job cluster. The managerial job cluster employs exclusively people with university degrees whilst the clerical employs a mix of university and secondary school graduates. Section (4), by employing some selective criteria, proved that the clerical clusters in all four firms were associated with strong ILMs. The last condition, therefore, that has to be fulfilled to establish the presence of Bumping, is that the number of university graduates recruited increases through time.

In order to see whether this last condition is satisfied, the proportion of university graduates at entry level jobs (clerical jobs) was computed for 1974 and 1979 respectively. This percentage more than doubled for all four firms in the five-year period mentioned above.

Although it may be hazardous to derive any general conclusions from the recruiting policies of only four firms, and although it might also be necessary to assume that university graduates prefer to work for big companies

1. Details about the data collected are provided in Section (4).

(with ILMs)¹, it is tempting to say that there is evidence that bumping takes place in this particular segment of the Greek labour market. The implication is that demand for higher education in Greece is likely to increase despite an increase in the number of university graduates. As long as university graduates keep on bumping out high school graduates from this cluster (and that may take a considerable amount of time) the Greek passion for higher education (especially in the Social Sciences) will continue to grow despite increases in unemployment and under-employment. The Bumping model implies that education may well become a defensive necessity to individuals. In the words of Thurow:

As the supply of educated labour increases, individuals find that they must improve their education simply to defend their current income position. If they do not, others will, and they will not find their current jobs open to them. Education becomes a good investment, not because it raises an individual's income above what it would have been if no one had increased his education, but because it raises his income above what it would be if others acquire an education and he does not. In effect, education becomes a defensive expenditure necessary to protect your "market share". The larger the class of educated labour and the more rapidly it grows, the more such defensive expenditures become imperative. 2

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1. A possible reason might simply be risk aversion. It is generally valid that bigger firms offer greater job security and higher opportunities for promotion than smaller firms.
 2. Thurow, op. cit., p. 416.

(7) Conclusion

Although the discussion of the ILM concept gave the impression that internal markets are a twentieth century phenomenon, resulting from rapid technological growth, a family business can be thought of as the first, primitive example of a hierarchical structure insulated from external labour market forces.

Enterprise-specific skills (and on-the-job training), the size of firms (with the concomitant necessity to control work effort) and even attitudes and values of different societies¹ might have played a role in the formation, maintenance and development of ILMs. Firm size, though, rather than specific skills and attitudes, seems to be the most important determinant of the ILM structures.

The presence of fixed costs of training and the resulting permanent employment relationship abrogates the equality of the marginal product of labour and the wage rate at each period of time. The above equality is reduced to an equality between the discounted present value of expected costs and productivity streams calculated over the

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1. The literature on ILMs in Japan emphasizes the importance of attitudes and values in the formation of the so-called "nenkō" systems. For a discussion of ILMs in Japan see S. Jacoby, "The Origins of Internal Labour Markets in Japan", Industrial Relations, Spring, 1979, pp. 184-196 and M. Sumiya, "Japanese Industrial Relations Revisited: A Discussion of the Nenkō System", Japanese Economic Studies, Spring, 1977, pp. 3-65.

distribution of expected employment tenure within the enterprise. Moreover, the organizational constraints of ILMs (associated with size) imply that these firms are forced to pay a premium to secure a steady flow of labour services. The real difference between ILM theory and human capital theory is the neglect by the latter of the organizational constraints that ILM structures impose on the wage determination process.

To test for the presence of ILMs, some selective criteria are established and are applied to a four company sample of white collar employees. The evidence showed that the clerical job clusters of these firms were associated with strong ILMs.

Finally, the relationship between the Bumping model of the labour market and ILM structures was analysed. Strong ILMs are a necessary but not sufficient condition for bumping to take place. Some tentative evidence was provided to show that bumping is taking place in the white collar job clusters in Greece, i.e. the demand for university education will not necessarily decrease as the number of university graduates grows. Investment in education becomes then a defensive expenditure by individuals to protect their "market share".

CHAPTER 4
SEX DISCRIMINATION INSIDE ILMs

The object of this chapter is to study sex discrimination inside internal labour markets and present some findings based on a three-company sample. Section (1) surveys various theories of sex discrimination. Section (2) summarizes the empirical work undertaken to quantify the magnitude and extent of sex discrimination. Section (3) discusses sex discrimination in the context of Internal Labour Markets (ILMs). Section (4) presents some empirical results based on a Greek three-company sample of white - collar employees. Section (5) presents the conclusions.

(1) Theories of Sex Discrimination in Labour Markets

The literature on sex discrimination inside labour markets (or employment discrimination) distinguishes between the following forms of discrimination:

- (a) unequal pay for equal work;
- (b) unequal occupational distribution (or crowding);
- (c) a combination of (a) and (b).

One could also distinguish between two types of theories pertaining to explain the forms of discrimination mentioned above;

- (a) Theories of discrimination - such as those of

Becker¹ and Arrow² - that use as building blocks the utility maximizing behaviour of managers and workers and

- (b) the theories of others - such as Bergmann³ or Thurow⁴ - that give important weight to extra-firm forces.

(a) Competitive Theories

The first vigorous attempt to explain sex discrimination, was the neoclassical model developed by Gary Becker⁵ to account for racial discrimination. The model is based on the fundamental microeconomic principle of utility maximization, in the context of a perfectly competitive economy. Earnings, hiring and promotion differences between men and women are seen to derive from "tastes for discrimination" - i.e. male preferences to minimize (or avoid) the psychic costs of employing, buying from, or

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1. Gary Becker, The Economics of Discrimination. Chicago: University of Chicago Press, 1957.
 2. Kenneth Arrow, "Models of Job Discrimination" in A.H. Pascal (ed.), Racial Discrimination in Economic Life. Lexington, Mass.: Heath, 1972.
 3. B.R. Bergmann, "The Effect on White Incomes of Discrimination in Employment", Journal of Political Economy, March/April, 1971, pp. 294-313.
 4. L.C. Thurow, Poverty and Discrimination. Washington: The Brookings Institution, 1969.
 5. Becker, op. cit.

working with women. According to this approach, wage differentials between men and women derive from invidious discrimination by the former, in their roles as employers, employees and consumers. Becker's work, further employs the microeconomic tools of trade theory to demonstrate who gains and who loses when discrimination occurs.

Apart from Becker's contribution, the two major theoretical perspectives explaining the male-female wage differential are

- (a) the so-called statistical theories of discrimination, emphasizing demand factors and
- (b) human capital theory, with emphasis on supply considerations.

Statistical theories of discrimination, usually associated with the names of E. Phelps¹, K. Arrow², J. McCall³, M. Reder⁴ and M. Spence⁵, focus on certain implications of employer uncertainty about the productivity of

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- 1. E.S. Phelps, "The Statistical Theory of Racism and Sexism", American Economic Review, September, 1972, pp. 659-61.
 - 2. Arrow, op. cit.
 - 3. J.J. McCall, "The Simple Mathematics of Information, Job Search and Prejudices", in A.H. Pascal (ed.), Racial Discrimination in Economic Life. Lexington, Mass.: Heath, 1972.
 - 4. M.W. Reder, "Human Capital and Economic Discrimination" in I. Berg (ed.), Human Resources and Economic Welfare: Essays in Honour of Eli Ginzberg. New York: Columbia University Press, 1972.
 - 5. M. Spence, Market Signalling. Cambridge, Mass.: Harvard University Press, 1974.

racial or sex groups of workers, particularly in the context of hiring and placement decisions. The essence of the argument in all variants of statistical discrimination¹ theories is that employers reward workers on the basis of some underlying productivity-generating characteristic that is unobservable, at least in the initial years of employment. As a result, the firm must employ proxies that measure the underlying characteristic with error, according to the relationship

$$q = (1 - \lambda)x + \lambda y + u$$

where q is the desired characteristic (e.g. intensity of work or stability of employment), x is the group mean of that characteristic, y is the test score, u is a random error and $(1 - \lambda)$ and λ can be interpreted as regression coefficients. In his pioneering article, Phelps² assumes that the group means of the characteristic in question differ and that this difference is known to the employer (i.e. $x^M > x^F$). But since the actual characteristic is unobservable, the employer must rely on a test (y), and the relationship of that test to the actual characteristic

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1. For a good review of the various variants of statistical discrimination see D.J. Aigner and G.G. Cain, "Statistical Theories of Discrimination in Labour Markets", Industrial and Labour Relations Review, January, 1977, pp. 175-87.
 2. Phelps, op. cit.

includes an error term. In this situation, the employer, knowing that the group means are different, uses sex for information, and this results in women receiving lower earnings than men with the same y score.

It is exactly this kind of statistical discrimination that Doeringer and Piore have in mind when discussing racial discrimination. (There is every reason to believe that their argument equally applies to sex discrimination), To quote from their book:

In the case of minority groups, inadequate experience in developing suitable screening criteria may, at least initially, raise screening costs and therefore deter their employment. Some portion of what appears to be racial discrimination is probably generated by these costs. Race is an inexpensive screening criterion. Where two racial populations differ significantly in terms of the proportion of persons possessing certain desired characteristics, the most efficient hiring policy may be simply to reject all members of one racial population. 1

In another source F.B. Blau and C.L. Jusenius² when discussing sex discrimination, claim that

...stereotyping, the treatment of each individual member of a group as if he/she possessed the average characteristics of the group is appropriately defined as a form of discrimination, even if the employers' perceptions of the average group differential are correct. 3

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1. Doeringer and M. Piore, op. cit., ch. 7, p. 139.
 2. F. Blau and C.L. Jusenius, "Economists' Approaches to Sex Segregation in the Labour Market: An Appraisal", in M. Blaxall and B. Reagan (eds.), Women and the Work Place. Chicago: University of Chicago Press, 1974.
 3. Ibid., p. 194.

It is noteworthy that these authors, although they recognise that the employers' decisions may well be correct on average, still choose to call such behaviour "discriminating". They fail to realise that the assertion that an employer is "discriminating" says no more than that the decision maker, like the rest of us in our decisions, lacks perfect knowledge !

Another version of statistical discrimination rests on the notion that the reliability of the tests, used by the employer, differs for men and women. It may be, for example, that an employer feels less able to judge the potential stability or intensity of women workers. The mean values may be the same or similar, but the relationship $q = (1 - \lambda)x + \lambda y + u$ may be thought to be less reliable for women, perhaps because a few women withdrew their services in an unpredictable manner. Believing this to be true, a risk averse employer would pay women less than men with the same measured y and q scores.

In terms of the two extreme forms of discrimination (unequal pay for equal work and occupational segregation), statistical discrimination theories can surely explain the latter. If, for example, an employer is assumed to offer a range of occupations differing in the degree of stability of employment and continuity of work effort required, and if it is further assumed that he knows that, on average, women have a lower labour force participation than men, it will be rational for him to allocate

women to those occupations where stability of employment is not an essential characteristic. On the other hand, statistical theories of discrimination do not seem able to explain unequal pay for equal work. Learning behaviour on the part of the employers will reduce uncertainty and hence discrimination, even if during the first years of employment such a form of discrimination might be present. But as will be seen in section (3), statistical discrimination theories, when applied to Internal Labour Markets, may well explain unequal pay for equal work.

Human capital theory (or labour supply explanation) is the second theoretical perspective that has increasingly been brought to bear on observed male/female differences in earnings. In the extreme, this approach seems to be formulated to demonstrate that observed sex differences are the result of differences in productivity due to sex differentiation in the household division of labour. The essence of the theoretical argument is that women have different expectations from males about labour force participation over a lifetime and therefore:

- (a) the process of occupational choice is different for females than males since they expect, especially after marriage, to be "secondary" earners;
- (b) women make different decisions than men about investment in their own human capital both during and after formal schooling;
- (c) women with families work less intensively than men

as a result of their family responsibilities.

Argument (b) has been utilized by J. Gwartney and R. Stroup¹ to indicate why differences in the earnings of single and married women exist and persist. Mincer and Polachek² have stressed argument (c), i.e. that married women with children work less intensively because of their family responsibilities. Using a national sample, they found that the child variable was insignificant in explaining differences in full time earnings among women as a whole, but negative and significant in a sample limited to highly educated women with strong labour force attachment. They suggest that this subgroup adjusts its labour supply in response to marriage and children not by working part-time or part of the year but rather by working shorter hours or with less intensity. There is an additional twist in their argument: married men may work harder than single men because of the family division of labour (their wives do the housework).

Although sex differentiation in work intensity and in post school investments seem to account for unequal pay for equal work, there is only a limited literature

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1. J. Gwartney and R. Stroup, "Measurement of Employment Discrimination According to Sex", Southern Economic Journal, April, 1973, pp. 75-87.
 2. J. Mincer and S.W. Polachek, "Family Investments in Human Capital: Earnings of Women", Journal of Political Economy, Part II, March/April, 1974, pp. S76-S108.

among human capital theorists,¹ dealing with the phenomenon and causes of occupational segregation. Contrary to what many critics have argued, human capital theory is perfectly able to explain occupational segregation. Occupations vary with respect to the continuity of activity required (or stability of employment) for acceptable performance and with respect to the amount of formal training necessary for entrance. Women are aware of that and, therefore, tend to choose occupations in which continuity of activity and amount of pre and post-school investments are not essential, since a decision in the opposite direction would be in conflict with their roles as wives and mothers.

Although, admittedly, human capital theory is a supply based explanation of occupational segregation, it is not the only supply based explanation. It can be argued, for example, that the process of occupational choice by women, which results in occupational crowding,

- (a) is influenced by discrimination that already exists inside the labour market
- (b) is the result of discrimination prior to labour market entrance, (i.e. the cultural values inculcated at home and at school influence occupational choice and hence occupational segregation).

1. G.E. Johnson and F.P. Stafford "The Earnings and Promotion of Women Faculty", American Economic Review, December, 1974, pp. 888-903 and S.H. Sandell, "Male - Female Salary Differences among Scientists with Ph.D.'s", unpublished Ph.D. thesis, University of Minnesota, 1973.

The three supply based explanations of crowding are obviously not mutually exclusive. It is very likely that all three of them are partly true. But the important question that emerges from the supply based explanations of occupational segregation and is usually neglected in the literature is the following: Is it desirable to change the role of women in society ? If it is accepted that women do not possess a comparative advantage over men in the upbringing of their children there would be a strong case in favour of such a change. But if consensus points to the contrary, efforts to equalise the occupational distribution are meaningless and bound to fail.

(b) Non-competitive theories

The salient characteristic of these theories is that they abandon the assumption of competitive labour markets. A good example of this kind of theory can be found in B. Bergmann's research work.¹ Her approach retains much of the neoclassical framework and does not preclude the existence of pure wage discrimination, i.e. unequal pay for equal work. Basically, the hypothesis is that women are crowded into a small number of occupations by the power and preferences of men. This crowding generates a situation of excess supply to those occupations depressing the

1. Bergmann, op. cit.

marginal productivity of women (and men) in those segments of the labour market. Thus, even if men and women are paid the value of their marginal products, sex differentials arise and persist.

Many other theories are based on market imperfections to explain discrimination. L. Thurow argued that the monopsony power of employers is an important explanation.¹ In a similar vein, J. Madden² considers both the traditional paradigm of monopsony and the implications of assuming the existence of male-employee monopoly power over labour supply. In the spirit of Madden's work, N.M. Gordon and T.E. Morton³ have developed a model of wage discrimination that emphasizes both market imperfection and discriminatory "tastes" of fellow employees to explain sex differentials in earnings. Finally, what has recently come to be known as "radical" economics seems to incorporate the neoclassical assumption of profit maximization and Marxian assumptions of monopoly capitalism and class interests to explain discrimination in the form of segmented labour markets.⁴

1. Thurow, op. cit.

2. J.F. Madden, The Economics of Sex Discrimination. Lexington, Mass.: Heath, 1973.

3. N.M. Gordon and T.E. Morton, "A Low Mobility Model of Wage Discrimination - With Special Reference to Sex Differentials", Journal of Economic Theory, March, 1974, pp. 241-53.

4. For a good survey see R. Marshall "The Economics of Racial Discrimination: A Survey", Journal of Economic Literature, September, 1974, pp. 849-71.

Be that as it may, all that can be said about these non-competitive theories is that they lack the analytical rigour of competitive ones and, furthermore, they do not lead to any decisive and testable prediction that might falsify them.

(2) Empirical Work

Paradoxically enough, the bulk of the research work on sex discrimination in the labour market, did not try to distinguish which theoretical framework fared better in the light of empirical evidence but, instead, focussed on which of the two forms of discrimination, i.e. unequal pay for equal work and occupational segregation was more prevalent in the labour market. The underlying reason was that the forms (rather than the theories) of discrimination provided important and diametrically opposite policy implications. If the sex differential in earnings can be better explained in terms of unequal pay in the same (narrowly defined) occupations, equalizing pay legislation could lead to a rapid elimination of this differential. If on the other hand, the greatest differences in the earnings profiles of men and women were across occupations, legislative measures to promote "equal pay for equal work" would be unwarranted and, hence, far more sweeping changes to alter the occupational distribution might be required. (Which, of course, are likely to require several years, perhaps generations,

to accomplish.)

In many empirical studies, the importance of labour market discrimination as a source of sex differentials, relies on the identification of discrimination as the "residual", after other sources of the differential have been held constant. In other words, since discriminatory behaviour is never directly observed, its existence must be inferred by (statistically) eliminating the other sources of sex differences in earnings (schooling, years of experience, occupations, etc.) and observing that differential which remains unexplained. This methodological technique usually takes the form of regression or standardization analysis. Following Becker¹, the majority of researchers using the "residual" approach have defined the market discrimination coefficient as the simple difference between the observed wage ratio and the wage ratio in the absence of discrimination. There are some difficulties with the "residual" approach however, which should be mentioned.

(a) It was stressed in the previous section that discrimination can take either of two forms:

- (i) unequal occupational distribution (or crowding)
- (ii) unequal pay for equal work (for the same occupations).

The important question that arises (and is usually neglected)

1. Becker, op. cit.

by the "residual" approach in the estimation of the quantitative importance of these forms of discrimination is the following: How do we standardize for equal work in the regression model ? Which occupational classification do we use for standardizing for occupations, (i.e. for equal work) ? It is obvious that the finer the occupational classification used, the less the importance of discrimination of the form of unequal pay for equal work and the more the emphasis on crowding (and vice versa). If, for example, ten broad occupational classifications are used, it will not be surprising that unequal pay for equal work will be claimed to be the dominant form of discrimination. On the other hand, this conclusion is reversed if, for example, the researcher uses a three-digit classification of occupations. The important thing to remember is that his conclusions depend critically on the degree of standardization undertaken.

(b) It is possible that the wage structure for males and females would differ, even in the absence of discrimination. For example, male-female differences in the coefficients of the experience variable suggest that the rate of return to on-the-job training (OJT) may be higher for males and/or females invest less in OJT. One might argue, that even in the absence of discrimination, females may plan on shorter working lives and hence invest less than men. The result would be a difference in the parameters of the experience variables, yet these differences contribute to

the effects of discrimination under the "residual" approach. In defence of this approach, however, it should be pointed out that occupational barriers against women deny them the opportunity to invest to the same extent as men. Moreover, the short work life expectancy of women may represent a rational response to anticipated discrimination in the labour market. The issue becomes one of how much of the male-female difference in the coefficients of the regression analysis is due to discrimination.

(c) Another difficulty with the residual approach is that it does not take into account the effects of the feedback from labour market discrimination on the male-female differences in the selected individual characteristics. In other words, differences in behaviour can be the result as well as the cause of differences in earnings, and hence a relatively modest amount of direct discrimination may well result in a great deal of "cumulative" discrimination. Discrimination in the labour market, for example, may influence the occupational choice of women and result in further occupational segregation.

As M. Ferber and H. Lowry¹ have remarked:

Focussing on the narrow issue is thus not particularly useful and perhaps even misleading. For such an emphasis ignores the fact that, like a stone cast into water, discrimination introduced into the labour market is likely to produce effects considerably more far reaching than the initial impact itself.²

Unfortunately, the cumulative or "multiplier" effects of discrimination cannot be estimated from the data. The

1. M.A. Ferber and H.M. Lowry, "The Sex Differentials in Earnings: A Reappraisal", Industrial and Labour Relations Review, January, 1976, pp. 377-387.

2. Ibid., p. 386.

sociologists' work on the occupational choice for women may throw some light on this important question.

(d) A further comment needs to be made with regard to the empirical studies using the "residual" approach. All of them assume that the earnings of both men and women in various occupations will remain as they are, even as a large proportion of women move from one occupation to another. This assumption is unwarranted, however, for a sharp decrease in supply is likely to result in a higher wage rate and an increase in supply in a lower wage rate. Men's and women's earnings are not likely to be affected to the same extent, because predominantly male occupations would experience the greatest influx of workers and, therefore, the greatest relative wage reductions. Estimates based on present earnings will not reflect accurately what would happen if there were a major change in the occupational distribution of women.

(e) Apart from the problems mentioned above, the econometric methods employed to hold constant factors other than discrimination in computing the residual, may produce conflicting conclusions, even with a common data set. For example, if there are any interactions between sex and other determinants of earnings, regression analysis employing a dummy variable to represent sex (discrimination) will yield quite different conclusions from those obtained by estimating separate regression equations for males and

females and standardizing on one set of the parameters. Furthermore, there are severe multicollinearity problems when marriage and children variables enter earnings functions used in the analysis. The difficulty may arise, for example, from the correlation between years of experience and the marital and children variables. Likewise, the earnings function regression techniques used, may generate conclusions that differ from those produced by regression analysis of a multiple equation model (which may, or may not, be a simultaneous system). Research work on sex discrimination has been voluminous (especially in the U.S.) and, hence, the review of the literature undertaken below, due to space limitation, focuses on studies based on national samples of the work force.

This is not to deny the contribution of many studies of more restricted groups such as academics, A.E. Bayer and H.S. Astin,¹ M.G. Darland et al.,² G.E. Johnson and F.P. Stafford³ and S. Sandell;⁴ non-academic

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1. A.E. Bayer and H.S. Astin, "Sex Differences in Academic Rank and Salary Among Science Doctorates in Teaching", Journal of Human Resources, Spring, 1968, pp. 191-200.
 2. M.G. Darland et al., "Application of Multivariate Regression to Studies of Salary Differences between Men and Women". Paper presented at the annual meetings of the American Statistical Association, December, 1973.
 3. G.E. Johnson and F.P. Stafford, op. cit.
 4. S. Sandell, op. cit.

professionals, B. Bosworth,¹ A.J. Corrazini,² B.G. Malkiel and J.A. Malkiel,³ W.G. Shepherd and S.G. Levin,⁴ H. Zincone and F.A. Close;⁵ or selected clerical and blue collar workers, F.D. Blau,⁶ J.E. Buckley,⁷ M.T. Hamilton,⁸ and D.J. McNulty.⁹

Several U.S. economists have employed data from decennial Censuses to analyse the sex differential in

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1. B. Bosworth "An Examination of Male and Female Earnings in Professional Industry and Occupational Classification". Paper presented at the meetings of the Am. Stat. Association, December, 1973.
 2. A.J. Corazzini, "Equality of Employment Opportunity in the Federal White-Collar Civil Service", Journal of Human Resources, Fall, 1972, pp. 424-45.
 3. B.G. Malkiel and J.A. Malkiel, "Male-Female Pay Differentials in Professional Employment" American Economic Review, September, 1973, pp. 693-705.
 4. W.G. Shepherd and S.G. Levin "Managerial Discrimination in Large Firms", Review of Economics and Statistics, November, 1973, pp. 412-22.
 5. L.H. Zincone Jr. and F.A. Close, "Sex Discrimination in a Paramedical Profession", Industrial and Labour Relations Review, October, 1978, pp. 74-85.
 6. F.D. Blau, "Pay Differentials and Differences in the Distribution of Employment of Male and Female Office Workers", unpublished Ph.D. thesis, Harvard University, 1975.
 7. J.E. Buckley, "Pay Differences Between Men and Women in the same Job", Monthly Labour Review, November, 1971, pp. 36-39.
 8. M.T. Hamilton, "Sex and Income Inequality Among the Employed", Ann. Amer. Acad. Polit. Soc. Sci., September, 1973. pp. 42-52.
 9. D.J. McNulty, "Differences in Pay Between Men and Women Workers", Monthly Labour Review, December, 1967, pp. 40-43.

earnings. H. Sanborn¹, using data from 1950 U.S. Census, found the female/male annual income ratio to be .58 which implies a male/female wage differential (as a proportion of the female wage) of .72. Sanborn's stated objective was to consider discrimination only in the context of unequal pay for equal work and not to deal with discrimination stemming from occupational segregation. Using both male and female adjustment weights, Sanborn adjusted the income ratio for occupational distribution, annual hours of work, education, urbanness, race, turnover, absenteeism and work experience. In his attempt to approximate equal work, Sanborn controlled for 262 detailed occupations. These adjustments brought the income ratio up to .87 - .88. The residual difference was therefore .13 and about 18% of the original differential. He, thus, concluded that the principal manifest form of discrimination is occupational segregation.

V. Fuchs² analysis of 1960 U.S. Census data, led to conclusions analagous to Sanborn's. Fuchs calculated the hourly earnings of females relative to males to be .60, which implies a male-female wage differential of .66. The earnings ratio was raised to .66 after adjustments for

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1. H. Sanborn, "Pay Differences Between Men and Women", Industrial and Labour Relations Review, July, 1964, pp. 534-50.
 2. V.R. Fuchs, "Differences in Hourly Earnings Between Men and Women", Monthly Labour Review, May, 1971, pp. 9-15.

colour, schooling, age, city size, marital status, class of worker and length of trip to work. This adjusted ratio implies a residual difference of .51 which is 77% of the original differential. From the results of his regressions of hourly earnings across occupations, Fuchs concluded that nearly all of the wage differential could be explained away if one chose sufficiently narrow occupational categories. He concluded that the principal explanation for the lower wages of females is role differentiation which affects occupational choice, labour force attachment, post-school investments, etc.

Gwartney and Stroup¹, using appropriate data from both the 1960 and 1970 U.S. Census and relying principally on frequency-distribution standardization, concluded that sex difference in employment preferences seemed more important than discrimination in causing income differences according to sex..

Consistent with these conclusions are also the results of M. Cohen's² analysis of data for full-time wage and salary workers aged 22 - 64 obtained from the 1969 Survey of Working Conditions. An interesting and unique feature of Cohen's study is the analysis of the impact of fringe benefit differences between men and women. His calculation indicated that not only are the fringe benefits

1. Gwartney and Stroup, op. cit.

2. M.S. Cohen, "Sex Differences in Compensation", Journal of Human Resources, Fall, 1971, pp. 434-47.

received by women not compensatory for their lower earnings, but that holding fringe benefits constant actually widens the earnings gap.

In comparison to the preceding studies, several researchers who utilized data from the 1967 Survey of Economic Opportunity (SEO) have attributed larger proportions of the observed sex differential in earnings to labour market discrimination. In one of the most elaborate studies, R. Oaxaca¹ controlled for a large number of personal and environmental characteristics in order to adjust a female/male hourly wage ratio from .65 to .72 among urban whites and from .67 to .69 among urban blacks. When he added controls for occupation, industry and class of worker, the adjusted ratios rose to about .78 and .80 respectively. Thus, even if sex segregation by industrial sectors, major occupations groups and class of worker is considered to be solely the product of role differentiation (e.g. socialization), Oaxaca's findings imply that about three-fifths of the wage gap is due to sex discrimination in the labour market. Other researchers like B. Bluestone et al., who have used SEO data,² also concluded that standardization for education, occupation and industry still

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1. R. Oaxaca, "Male-Female Wage Differentials in Urban Labour Markets", International Economic Review, October, 1973, pp. 693-709.
 2. R. Bluestone, W.M. Murphy and M. Stevenson, Low Wages and the Working Poor. The Institute of Labour and Industrial Relations, University of Michigan, 1973.

left a substantial female/male disparity in wages unexplained.

Summarizing her more extensive study based on 1967 Current Population Survey data for wage and salary workers, I.V. Sawhill¹ found that the female/male annual earnings ratio could be adjusted from .46 to .56 by controlling for race, region of residence, education, age and hours of work. Additional adjustment for sex differences in age-earnings profiles (an approximation to more accurate measurement of women's on-the-job training (OJT) provided by actual labour experience) increased the ratio only to .57. Sawhill concluded that her results were consistent with the hypothesis that discriminatory segregation of women into occupations is at the root of the earnings gap, in that it precludes women from receiving training, lowers their aspirations and restricts their job search.

Finally, A. Blinder² draws conclusions similar to Oaxaca's on the basis of data from the University of Michigan Survey Research Center's Income Dynamics Panel. That is, Blinder's analysis of employed, white heads of household who were 25 years of age and older (in 1967) led him to conclude that two-thirds of the female/male wage differential

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1. I.V. Sawhill, "The Economics of Discrimination Against Women: Some New Findings", Journal of Human Resources, Summer, 1979, pp. 383-96.
 2. A. Blinder, "Wage Discrimination: Reduced Form and Structural Estimates", Journal of Human Resources, Fall, 1973, pp. 436-55.

was due to outright discrimination in labour markets. In addition, he attributed the remaining third of the wage difference to discrimination in occupational assignment (and seniority) by estimating both reduced-form and structural wage determination equations.

Research work on sex discrimination using Canadian data can be found in the work of R. Holmes¹, R. Robb² and M. Gunderson.³ Gunderson, using Oaxaca's residual approach and 1971 Canadian Census data, found that female earnings were approximately 60% of male earnings with slightly over 60% of the gap attributable to outright wage discrimination after controlling for education, experience, marital status, region and 16 arbitrary occupational categories.

British research work on sex discrimination is represented by two articles by B. Chiplin and P.J. Sloane.⁴ They attempted to assess the relative importance of unequal pay for equal work and unequal employment distribution in

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1. R. Holmes, "Male-Female Earnings Differentials in Canada", Journal of Human Resources, Winter, 1976, pp. 109-12.
 2. R. Robb, "Earnings Differentials Among Males and Females in Ontario, 1971", Canadian Journal of Economics, May, 1978, pp. 350-59.
 3. M. Gunderson, "Decomposition of Male-Female Earnings Differential: Canada, 1970", Canadian Journal of Economics, August, 1979, pp. 479-85.
 4. B. Chiplin and P.J. Sloane, "Sexual Discrimination in the Labour Market", British Journal of Industrial Relations, November, 1974, pp. 371-402 and "Male-Female Earnings Differences: A Further Analysis", British Journal of Industrial Relations, March, 1976, pp. 77-81.

explaining the gross male-female earnings differential in Great Britain, by making use of 1971 and 1974 New Earnings Survey. Their findings suggested that unequal pay was far more important than unequal occupational distribution in explaining the wage gap between the sexes. (Their most recent article utilizing the 1974 NES data showed that the gross differential of £18.5 can be divided into £12.5 (or 67.6%) for earnings differences and £4.6 (or 24.9%) for occupational distribution differences.) They suggest, therefore, that equal pay legislation has more potential for improving female earnings than equal opportunity legislation. Similar results are also reported by Addison¹ on an industrial basis, for a comparative study using data from four European countries (Germany, Italy, Holland and Belgium).

It is easier to summarize the many studies that have been conducted than to synthesize their findings and to make confident generalizations about the nature, extent and sources of sex differentiation in the labour market. The many differences in data sources, in models, and in methods of analysis make comparison hazardous and difficult. The "residual" approach that many of the studies reviewed have used, was seen earlier to suffer from severe defects. To add to these difficulties, even if one accepts that

1. J.T. Addison, "Sex Discrimination: Some Comparative Evidence", British Journal of Industrial Relations, July, 1975, pp. 263-65.

occupational differentiation is an important source of the observed sex differential in earnings, it is by no means clear to what extent the differentiation is produced by labour market discrimination (e.g. in promotions) or by sex role discrimination in the home and schools. Having said that, it becomes apparent that focussing on whether two-thirds or one-third of sex differential in earnings can be explained by unequal occupational distribution, becomes at best an issue of secondary importance.

(3) Sex Discrimination Within Internal Labour Markets

The salient characteristic of ILMs, as was seen in Chapter 3, is the permanent employment relationship. Quite apart from human capital variables, which directly affect productivity, stability of employment can be considered as an independent, desirable characteristic for which employers are prepared to pay a premium. It can be thought as the time dimension of the productivity vector.

In Chapter 2, it was also seen that the hierarchical ILM structure may well have been necessitated by the organizational imperatives of large firms.

Bearing these facts in mind and assuming that women are on average less stable than men, in large firms (with ILMs) one would expect to find (a) a wage differential among the sexes (b) a more male oriented composition of the labour force as compared to that of small or medium sized firms. The Report of the Bolton Committee in Small Firms has confirmed this last hypothesis.¹

It is the object of this section to elucidate the

1. The Report of the Bolton Committee in Small Firms, op. cit.

theoretical implications and predictions of the two dominant theories of discrimination, i.e. labour supply (human capital) and statistical theories, in the context of Internal Labour Markets. As was mentioned before, in analyzing the sex differential in earnings, the results are very sensitive to the occupational (or job) standardization undertaken. For example, the researcher may use

- (a) one, two, three or more digit occupational classifications;
- (b) job clusters as those proposed by Dunlop and Scoville, that is clusters of jobs with the same focus;
- (c) narrowly defined job titles.

In our own empirical work on wage discrimination, the job cluster standardization is utilised, since the job cluster is the essential characteristic of the Internal Labour Market.

(a) Statistical Discrimination

To recap, these demand based theories of discrimination focussing on employer's uncertainty about the prospective workers quality, were argued to be able to explain occupational (or job cluster) segregation but not unequal pay for equal work (i.e. unequal pay inside the same job cluster holding personal characteristics constant).

Occupational segregation takes place at the hiring point. If the employer knows that, on average, women have a lower labour force participation than men, it will be rational for him to allocate women mostly to those clusters where work intensity and/or stability of employment is not an essential characteristic. In the context of ILMs, crowding can take place

not only among job clusters but within clusters as well. That is women may have unequal promotion opportunities compared to men (at least during the first years of employment), holding pre-employment training and experience constant, since the employer rightly believes that they are on average less stable than men. Women will be given less on-the-job training than men and in general they are not expected to realise returns to their human capital characteristics as high as those that men do. This kind of discrimination, although present during the first years of employment, is assumed to be lessened through time, as learning behaviour on the part of the employer reduces uncertainty and hence discrimination.

Statistical theories of discrimination do not seem, therefore, able to explain unequal pay within job clusters. It is legitimate, though, to argue that, ^{the} in context of ILMs, early statistical discrimination may have irreversible effects. In hierarchically organised structures, like the ILMs, the loss of even one grade in the promotion ladder during the early years of employment may render catching up difficult. If that is the case, learning behaviour cannot reverse the effects of early discrimination.

Be that as it may, the stability value of married and single women within ILMs is another point that deserves clarification. It is generally true that single women (without family responsibilities) work harder than married women or women with children and, hence, command more pay. One therefore expects that when the marriage and children variables are entered in an earnings function among women, they will have a negative sign. Within ILMs, this is not necessarily so. Women with children may work less hard than single women, but from the employer's viewpoint may be more stable (show stronger

labour force attachment) than single ones, since they have decided to continue to work despite their family obligations. Single women, on the other hand, although hard working, may be more unstable from the employer's viewpoint, since it is possible that they will withdraw their services at the time of their marriage. In the context of ILMs, therefore, it is not possible to determine a priori the sign of the marriage and children variables in an earnings function among women.

(b) Labour Supply Theories of Discrimination

Human capital theories of discrimination are able to explain both occupational segregation and unequal pay for equal work. Women's belief that their major role in life is in child-bearing influences occupational choice. This results in women choosing on average less career oriented occupations than men. Inside occupations, women work less hard than men because of their family responsibilities and therefore get less pay. Married women and women with children are expected to work less hard than single ones. Married men, on the other hand, are expected to work harder than single men, according to the same division of labour argument.¹

In sum, the labour supply theories of discrimination lead us to expect a negative sign for the marriage and children variables in an earnings function among women, and a positive sign for the same variables in an earnings function among men.

1. Especially in the context of LDCs, the last proposition might not necessarily be true. In countries without the dowry system, for example, a strong financial position might be a prerequisite for marriage.

(c) Synthesis

It should be borne in mind that the controversy between the labour supply (or human capital) and the statistical theories of discrimination in explaining the sex differential in earnings bears striking resemblance to the controversy between human capital and "screening" theories in explaining the higher earnings of more educated people.

According to supply based human capital theories more educated people are more productive than less educated ones and hence get more pay. Men, on the other hand, work harder than women because they have no household responsibilities and receive higher earnings.

According to the demand based statistical theories, education and sex are treated as "screens" by employers, since they know that on average these characteristics are associated with differential productivity. Statistical discrimination by sex or education seems, at best, able to explain differential starting salaries, since, as time passes, employers have every opportunity to acquire evidence on job performance and do not have to rely on "screens". Early statistical discrimination by education or sex, however, may have irreversible effects in the context of hierarchically organised ILMs, where seniority provisions predominate in wage determination.

Thus, it may well be the case that statistical theories and labour supply explanations of the sex differential in earnings may indeed be regarded as complements rather than substitutes. Women get less pay because they

work less hard than men, and because they have been statistically discriminated at the hiring point, which, in the context of ILMs, makes catching up difficult.

(4) Sex Discrimination in Greek White-Collar Internal Labour Markets:
Three Case Studies

This section, using a three-company sample of over 400 white-collar employees, analyses sex discrimination within Internal Labour Markets, whose presence was established in the previous chapter.

This research is hoped to fulfil three objectives:

(a) To analyse and elucidate the role of marriage and children in wage discrimination in the context of Internal Labour Markets;

(b) by dividing each company into job clusters, to examine how the pattern of discrimination varies in the different parts of the company and to facilitate inter-firm comparisons of similar clusters;

(c) to distinguish which of the two dominant theories of discrimination, i.e. labour supply (or human capital) and statistical discrimination, seems more plausible in the light of the data.

Although academic work on sex discrimination is voluminous (especially in the U.S.), researchers have been shown to be hesitant in the use of firm-level data. The first attempt to study pay differentials and hence wage discrimination using micro, firm-specific data can be found in the pioneering article of Malkiel and Malkiel¹, who used a sample of 272 professional employees of a single U.S. corporation. Although the Malkiels examined the role of job levels, the jobs in their study seemed homogeneous with respect to skill type and thus, in effect, the authors studied promotion within the same job cluster. Their attempt was followed by the article of F.Cassell, S. Director and S. Doctors², who used a three company sample of over 2,300 blue-collar and lower-level white-collar workers but did not attempt to partition their sample into job clusters. The findings of both studies mentioned above are congruent in the sense that they conclude that: ignoring labour grade, women with job characteristics equal to those of men, fail to get the same pay. Yet, after current labour grade is held constant, through its inclusion in the regression model, the male-female earnings gap disappears.

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1. B.G. Malkiel and J.A. Malkiel, op. cit.
 2. F.H. Cassell, S.M. Director and S.I. Doctors, "Discrimination Within Internal Labour Markets", Industrial Relations, October, 1975, pp. 337-344.

Therefore:

...women with the same training, experience etc. as men tend to be assigned to lower job levels, but within levels it is different for discriminatory organizations to give male and female employees the same titles and pay them different amounts. 1

In an even more recent article, P. Osterman² analysed sex discrimination with data on over 700 professional employees of a New York publishing firm. The unique feature of this study is that he partitions his sample into clusters of similar jobs (he uses 11 job clusters). He finds that the sex differential in earnings within clusters is much greater if marriage and children variables are excluded; men receive a large "premium" from being married, but women do not. On analysing this difference, the author rejects a labour supply explanation and two variants of statistical discrimination, concluding that managers in this firm simply believe that married men deserve higher earnings than comparable women. It is quite extraordinary that Osterman is not prepared to devote even a single paragraph to rationalize his arbitrary conclusion. Why do married men deserve higher earnings than women? Is it a rational or irrational response by employers? Is it rational to expect that in a society

1. Malkiel and Malkiel, op. cit., p. 704.

2. P. Osterman, "Sex Discrimination in Professional Employment: A Case Study", Industrial and Labour Relations Review, July, 1979, pp. 451-64.

with a deeply rooted tradition of male chauvinism, males will ungrudgingly accept equal remuneration with women of similar individual characteristics ? If the answer to this last question is negative, it will be completely rational for employers interested in the smooth functioning of their firm, to maintain a wage differential among the sexes.

(a) The Data

The three companies under study belong to the 50 biggest companies of Greece. Firm (1) produces cement, Firm (2) is engaged in the extraction of Bauxite and Firm (3) produces textiles. The factories of these firms, employing the blue-collar workers, are situated outside Athens, but their headquarters with the white-collar employees are located in Athens.

The data came from 1979. All personnel records were surveyed for companies (1) and (2). For Firm (3), with approximately 700 white-collar employees, a 20% random sample was drawn.

The first step in our analysis is to map the 'internal labour market' in order to control for earnings differentials within the firm that arise from conditions in the external labour market. Imagine, for example, that a firm does not engage in hiring discrimination and its work force is divided equally between two

jobs: Job A, which pays an average wage of £5 an hour and on which 20% of the employees are women, and Job B, which pays an average of £3 an hour and on which 50% of the employees are women. An average wage, by sex, for the firm, or even an estimated wage that controls for personal characteristics, will show that women earn less than men. This earnings differential, however, is probably not due to discrimination by the firm but, rather, to conditions in the external labour market that set the wage for Job A higher than Job B and that determine the sex composition of the relevant labour pools. This line of reasoning assumes that wage differentials between jobs within a firm are determined by market forces and not by discrimination. We will come to this issue - the possible endogeneity of the job structure - in a later section.

In addition to controlling for the external labour market, use of internal job clusters permits a more sophisticated analysis of the company itself. On the assumption that the company is not a monolith with homogeneous behaviour throughout, the use of job clusters enables us to examine how the pattern of discrimination varies in its different parts.

The construction of the job clusters was made "by eye". Departments were grouped together if our understanding led us to believe that they performed similar functions. Job clusters with less than 10 observations were excluded from the analysis. This was rather

unfortunate, since we were forced to eliminate some job clusters from the data. (For example, sales and computing clusters were left out). Be that as it may, for companies (1) and (2), the following job clusters were identified:

- (a) administrative and clerical and
- (b) accounting.

For company (3) the identified clusters were:

- (a) managerial and
- (b) administrative and clerical.

Table (18) shows the sex composition of the job clusters together with the average salary of male and female employees in each cluster.

(b) Regression Analysis and Results

To explain wage discrimination inside internal labour markets we estimated the earnings equations using the semilog Mincerian form by now standard in the literature. The variables are defined in Table (19). The education and seniority variables are standard and require little elaboration. The experience variables measure actual years of experience as opposed to the Mincerian proxy $j = \text{Age} - \text{Education} - 6$, which is often used in national data sets. This difference is particularly important in studying sex discrimination because women's labour force participation tends to be more sporadic than men. The inclusion of marriage and children variables in the

TABLE 18

EMPLOYMENT AND EARNINGS IN SPECIFIED JOB CLUSTERS BY SEX

Job Cluster	Employees	% Female	Average Salary of Male Employees (Dr.)	Average Salary of Female Employees (Dr.)	Ratio of Female to Male Salaries
<u>FIRM (1)</u>					
Accounting	37	30	28557	18863	.660
Clerical	101	50	22669	15435	.681
<u>FIRM (2)</u>					
Accounting	33	42	21162	20089	.949
Clerical	135	48	19295	14619	.757
<u>FIRM (3)</u>					
Clerical	102	61	19166	14156	.738
Managerial	36	5	38372	17830	.452

TABLE 19Variable Definitions

ED 1	=	1 if university degree, 0 otherwise
NEXP	=	Years employed by the Company
NEXP 1	=	Square of previous variable
PEXP	=	Years of experience on jobs prior to joining the company
PEXP 1	=	Square of previous variable
SEX =	=	1 if male, 0 if female
MAR	=	1 if married, 0 otherwise
CHIL	=	Number of children
CLU	=	For Firms (1) and (2), 1 if employed in accounting job cluster 0 if employed in clerical job cluster For Firm (3) , 1 if employed in managerial job cluster 0 if employed in clerical job cluster

earnings equations raises some questions. Are they "legitimate" variables of an earnings function? It was emphasised in the previous chapter that stability of employment is the salient feature of ILMs. Increasing emphasis on stability implies that maintenance and control of work effort and loyalty assume paramount importance in personnel policies. Independently of any possible individual characteristic like education and training, the employer is therefore prepared to pay a premium for stability of employment which has two dimensions

- (a) low turnover rates
- (b) high and stable work effort levels.

Marriage and children have a direct influence on the stability characteristic. Married men, for example, may be expected to work harder than single men. They are also less likely to switch jobs than single men. Married women, on the other hand, may work less hard than single women because of the family division of labour argument. They may be less likely, though, to quit their jobs than single ones. If one recognises that an earnings function is actually a reduced form of a supply and demand system and that stability of employment belongs to the firm's demand function, one can see the plausibility of including marriage and children variables as proxies for stability.

Estimates of the earnings equation are included in Tables 20, 21 and 22 for the three companies respectively. The first two equations in each Table include sex dummies

and the first equation includes marriage and child variables, while the second excludes them. The next four equations in each Table are separate estimates for each sex, 3 and 5 including the marriage and child variables and 4 and 6 excluding them. These equations enable us to study in more detail the nature of the overall differential in earnings. Dummy variables included to control for job clusters will inevitably bias downwards the human capital variables like education and experience. Since our aim, though, is not to estimate the returns to education, inclusion of the job cluster dummies is justified.

It is interesting to note the the success of these earnings equations as measured by their R^2 statistics. These R^2 are higher than those typical of economywide studies, as might be expected since we are implicitly controlling for company idiosyncracies. On the other hand, however, as Wise¹ has shown, within company R^2 s are biased well down from one because the promotion process is necessarily stochastic and all individuals of like characteristics cannot be promoted at the same time.

The sex dummies in equations (1) and (2) show a substantial sex differential. This differential is reduced however with the introduction of the marriage and children variables. For equations (5) and (6) (for women), it is

1. D. Wise, "Personal Attributes, Job Performance and Probability of Promotion", Econometrica, September / November, 1975, pp. 913-931.

TABLE 20
(Firm (1))
REGRESSION RESULTS OF EARNINGS EQUATIONS IN WHICH
THE DEPENDENT VARIABLE IS LOG MONTHLY EARNINGS
(standard errors in parentheses)

Independent Variable	Full Sample		Men		Women		
	Eq. 1	Eq. 2	Eq. 3	Eq. 4	Eq. 5	Eq. 6	
SEX	.208* (.038)	.257* (.038)	-	-	-	-	-
NEXP	.045* (.007)	.051* (.008)	.043* (.010)	.054* (.012)	.065* (.014)	.065* (.013)	
NEXP 1	-.0004** (.0002)	-.0005** (.0002)	-.0004 (.0003)	-.0006 (.0003)	-.001** (.0008)	-.001** (.0007)	
PEXP	.027* (.008)	.034* (.008)	.019 (.010)	.030** (.011)	.025 (.024)	.031 (.022)	
PEXP 1	-.0008** (.0003)	-.0009* (.0003)	-.0006 (.0004)	-.0008 (.0005)	-.001 (.002)	.0008 (.002)	
ED 1	.197* (.051)	.198* (.054)	.302* (.071)	.326* (.080)	-.005 (.060)	-.004 (.059)	
MAR	.020 (.034)	-	.041 (.083)	-	.019 (.030)	-	
CHIL	.091* (.027)	-	.140* (.041)	-	-.011 (.032)	-	
CLU	-.016 (.046)	-.045 (.048)	-.053 (.062)	-.112 (.071)	.025 (.056)	-	
Constant	9.313	9.330	9.475	9.573	9.293	9.297	
R ²	.740	.700	.714	.606	.723	.721	
No. of cases	138	138	75	75	63	63	

Notes

Variables are defined in Table 19.

* = significant at the 1% level

** = significant at the 5% but not at the 1% level

TABLE 21

(Firm (2))

REGRESSION RESULTS OF EARNINGS EQUATIONS IN WHICHTHE DEPENDENT VARIABLE IS LOG MONTHLY EARNINGS

(standard errors in parentheses)

Independent Variable	Full Sample		Men		Women	
	Eq. 1	Eq. 2	Eq. 3	Eq. 4	Eq. 5	Eq. 6
SEX	.116** (.048)	.106** (.043)	-	-	-	-
NEXP	.045* (.011)	.052* (.010)	.042 (.015)	.053* (.014)	.052* (.020)	.043* (.016)
NEXP 1	-.0003 (.0001)	-.0005 (.0003)	-.0002 (.0004)	-.0005 (.0004)	-.0006 (.0006)	-.0003 (.0005)
PEXP	.024** (.012)	.025** (.012)	.0009 (.017)	.002 (.017)	.039 (.023)	.042 (.022)
PEXP 1	.00005 (.0005)	-.00005 (.0005)	.0008 (.0007)	-.0002 (.0007)	-.0007 (.0015)	-.0009 (.0015)
ED 1	.379* (.057)	.361* (.056)	.484* (.067)	.466* (.068)	.151 (.109)	.183 (.100)
MAR	.075 (.053)	-	.159** (.072)	-	-.062 (.079)	-
CHIL	-.014 (.029)	-	-.030 (.032)	-	-	-
CLU	.049 (.051)	.050 (.051)	-.039 (.066)	-.049 (.068)	.167** (.077)	.160** (.076)
Constant	9.191	9.200	9.295	9.315	9.220	9.222
R ²	.724	.719	.766	.744	.703	.699
No. of cases	168	168	95	95	73	73

Notes:

Variables are defined in Table 19

* = significant at the 1% level

** = significant at the 5% but not at the 1% level

TABLE 22
(Firm (3))

REGRESSION RESULTS OF EARNINGS EQUATIONS IN WHICH
THE DEPENDENT VARIABLE IS LOG MONTHLY EARNINGS

(standard errors in parentheses)

Independent Variable	Full Sample		Men		Women	
	Eq. 1	Eq. 2	Eq. 3	Eq. 4	Eq. 5	Eq. 6
SEX	.172* (.037)	.191* (.037)	-	-	-	-
NEXP	.027* (.007)	.030* (.005)	.038* (.013)	.041* (.009)	.016** (.006)	.021* (.005)
NEXP 1	.00007 (.0002)	-.00004 (.0002)	-.0002 (.0003)	-.0002 (.0002)	.0001 (.0002)	.00005 (.0002)
PEXP	-.011 (.013)	-.012 (.013)	-.012 (.019)	-.012 (.019)	-.018 (.065)	-.009 (.091)
PEXP 1	.0007 (.0005)	.0007 (.0005)	.0008 (.0007)	.0008 (.0007)	.0005 (.0004)	.0006 (.0007)
ED 1	.137** (.060)	.138** (.060)	.206** (.083)	.211* (.080)	-.006 (.108)	-.044 (.108)
MAR	.082 (.049)	-	.076 (.123)	-	.048 (.036)	-
CHIL	-.015 (.027)	-	-.023 (.046)	-	.011 (.026)	-
CLU	.369* (.057)	.385* (.056)	.331* (.075)	.339* (.073)	.318** (.135)	.392* (.131)
Constant	9.258	9.272	9.351	9.350	9.348	9.352
R ²	.865	.862	.820	.819	.723	.704
No. of cases	138	138	73	73	65	65

Notes

Variables are defined in Table 19

* = significant at the 1% level

** = significant at the 5% but not at the 1% level

interesting to see that marriage and child variables have no significant effect on earnings for all three companies. For equations (3) and (4), however (for men), the picture is less clear. For Firm (1) only the child variable is significantly different from zero. For Firm (2) the marital dummy is significant but not the child variable whilst for Firm (3) both variables are insignificant. Possession of a college degree does not significantly affect the earnings of women in all three samples. In contrast, for the three male equations, a university degree is associated with 30%, 48% and 20% more pay than secondary school degree, holding all other variables constant. It seems reasonable to argue, therefore, that university educated women suffer wage discrimination compared with their male counterparts, i.e. the returns to higher education for males are substantially higher than for women. This conclusion should be only tentative, though, since in all samples the number of females with university qualifications is very small (usually 7 - 8).

(c) Labour Supply Explanation

Does the labour supply explanation seem reasonable in the light of the data? To recap, this explanation argues that women with families, despite being full-time full year workers, work less intensely than do men, while married men, freed from home responsibilities work harder

than single men. Furthermore, sex differentials among single persons should not be significant, holding all other characteristics constant.

The coefficients in Tables 20 - 22 reveal the following pattern: For men, the marital status variable is only significantly different from zero for Firm (2). In this firm, a married man receives 16% more pay than a single man, holding everything else constant. The child variable is only significant in the equation for the first Firm, where every child increases pay by 14%. For women, neither the marriage nor the child variable have a significant effect (for all three firms).

Were the labour supply explanation true, marriage alone (without children) would increase men's earnings and decrease women's, but the earnings of women in this sample show no such effect, presenting, therefore, an inconsistent finding. Further, according to the explanation, children should have a negative effect on the earnings of women in terms of the division of labour argument. The results again are not consistent with the predictions of the labour supply hypothesis.

A strong believer in the labour supply hypothesis would argue that the earnings differential among single people is the true measure of discrimination. Running the earnings equation among single people did not result in any reduction of the sex dummy. The predictions of the labour supply hypothesis, once again, are not consistent with the

evidence.

(d) Statistical Discrimination

The distinguishing feature of this explanation is that differential outcomes are not the result of discrimination by intent or attitude but, rather, of information failures. The firm is assumed to reward workers on the basis of some underlying productivity-generating characteristic, which is usually defined in terms of intensity of work and/or stability of employment. The difference-in-means version of statistical discrimination assumes that the means of these characteristics differ for the two sex groups and that this difference is known to the employer. In itself this would pose no problem of discrimination. The employer could pay each person according to his or her stability establishing different group means in earnings; but men and women with the same stability value would be paid the same and an earnings function would display no discriminatory differential. Since the actual characteristic is unobservable, the employer uses the group means of this characteristic as information and this results in women receiving lower earnings than men.

Table 23 presents mean and median values of some variables important to this explanation. It shows that women in all three companies are considerably less likely to be married or have children than men. Average and

TABLE 23
MEANS AND MEDIANS OF SELECTED VARIABLES

(Firms 1-3)

Firm 1	Men	Women	Married Women	Single Women
NEXP	8.307(5.438)	6.143(5.143)	7.690(6.750)	4.938(4.167)
PEXP	4.293(.372)	1.063(.118)	1.034(.190)	.656(.100)
MAR	.760(.842)	.485(.996)	-	-
CHIL	1.147(1.281)	.444(.233)	-	-
Firm 2	Men	Women	Married Women	Single Women
NEXP	10.403(7.125)	8.571(6.813)	10.138(8.000)	6.300(3.500)
PEXP	1.855(.189)	2.102(.407)	2.690(1.125)	1.250(.167)
MAR	.597(.662)	.592(.655)	-	-
CHIL	.774(.412)	0 (0.000)	-	-
Firm 3	Men	Women	Married Women	Single Women
NEXP	15.233(16.875)	8.492(7.125)	10.432(8.917)	5.929(4.167)
PEXP	.986(.062)	.231(.033)	.270(.044)	.182(.023)
MAR	.726(.811)	.569(.622)	-	-
CHIL	1.096(1.176)	.615(.333)	-	-

Notes

- (a) values in parentheses are medians
 (b) variables are defined in Table (19)

median years of in-firm experience are lower for women than men, showing that women tend to stay for a shorter time in the company. They are on average less stable than men from the employer's viewpoint.

Employers in these firms, therefore, are perfectly justified to discriminate against women, at least during the early years of employment, since they are on average less stable than men. After a period of time, however, it is expected that the employer would learn about individual employees, and as a result the uncertainty and discrimination will diminish. The evidence though, is that learning behaviour does not lessen discrimination: as Tables 20, 21 and 22 show, the major source of the earnings differential between the sexes is differences in returns to education.

As was noted before, however, early statistical discrimination inside ILMs may have irreversible effects. The first argument is that the loss of even one grade in the promotion ladder during the early years of employment may render catching up difficult. According to the second, the fact that a woman is single does not necessarily imply for the employers that she has an equal stability value as men. For them, the uncertainty about a single woman's stability may not be reduced until the time she gets married. In the meantime she is offered less training and less promotion opportunities than men. In that case early statistical discrimination may indeed have durable effects.

In sum, statistical theories of wage discrimination inside ILMs, although admittedly difficult to test, cannot be refuted by the evidence.

(e) Job Structure

Thus far we have taken the job structure of the firm as given. We have used the skill clusters as controls without examining differences in treatment of women within them. This task is undertaken below.

The sex and seniority coefficients for the earnings equations run within each job cluster are shown in Table 24.

For both Firm (1) and Firm (2) the sex dummies show that the accounting job cluster seems to be associated with less discrimination than the clerical cluster. For Firm (2) in actual fact, the sex variable for the accounting cluster becomes insignificant. Thus if one accepts that the accounting cluster has a more central role in the company than

TABLE 24
REGRESSION RESULTS FOR SEX AND EXPERIENCE VARIABLES
BY JOB CLUSTERS¹

	FIRM (1)	FIRM (2)	FIRM (3)
<u>CLERICAL CLUSTER</u>			
SEX	.227*	.145**	.189*
NEXP	.073*	.050*	.024*
NEXP 1	-.002**	-.0003	-.0002
<u>ACCOUNTING CLUSTER</u>			
SEX	.201**	.059	not applicable
NEXP	.046*	.035*	
NEXP 1	-.0004	-.0003	

Notes

* Significant at both 5% and 1% levels

** Significant only at the 5% level

1. Other variables in the equations are ED 1, PEXP, PEXP 1, as defined in Table 19.

the clerical cluster (the higher average pay in the former corroborates this assertion), it appears that wage discrimination is less intense in the most prestigious job clusters of the company, contrary to the findings of Osterman¹, who found that the most prestigious clusters are the most discriminatory.

A plausible explanation of this phenomenon could be that in the case of the most prestigious and important clusters, employers discriminate at the hiring point and not inside these clusters. They will scrutinize very carefully women employees before appointing them to these clusters, which are central for the operation of the firm. By doing that, employers' uncertainty about women's ability and stability is greatly reduced and hence there is no compelling reason for further discrimination.

It is clear that the results presented above, due to the small sample sizes and the possible multicollinearity problems² should be interpreted with extreme caution. The suggestion also, that the more prestigious clusters are less discriminatory, is highly tentative (since only two clusters are being compared) and open for further empirical work.

1. Osterman, op. cit.

2. For an exhaustive treatment of the multicollinearity problem see J. Johnson, Econometric Methods (2nd edition). New York: McGraw-Hill, 1972, pp. 159-168.

5. Conclusion

Labour market discrimination is usually assumed to take the form of either occupational segregation or unequal pay for equal work (however defined). The voluminous research undertaken, especially in the U.S., in an effort to quantify the relative importance of these two forms of discrimination produced a wide variability of results and reinforced the confusion that already existed in the area. Most of the researchers failed to realise that their results critically depend on the kind and degree of occupational standardization undertaken. Moreover, although there seems to be consensus that occupational differentiation is an important source of the observed sex differential in earnings, it is by no means clear to what extent the differentiation is produced by labour market discrimination (e.g. in promotions) or by sex role discrimination in the home and schools which in turn might have been influenced by direct labour market discrimination (the incidence of cumulative discrimination).

In the context of ILMs, direct discrimination is said to exist when people with the same productivity generating characteristics, including stability of employment (which represents the time dimension of productivity) do not receive equal treatment. This time dimension of productivity is usually neglected in the discussion of wage discrimination and may well be one important explanation of the observed sex differential in earnings. The reduced stability value for women as compared for men may induce employers to invest less in women's training and offer them unequal promotion possibilities than men, thus, in effect, hindering them to realise the full returns to their human capital characteristics.

The two main competitive theories of wage discrimination explaining unequal pay within the same occupations (or job clusters) have been the demand based statistical theories which focus on the employers' uncertainty about the women's stability and/or work intensity, and the labour supply theories which stress that women work with less intensity than men because of their household responsibilities and, hence, get less pay.

It has been argued that statistical theories of discrimination can only explain differential starting salaries among the sexes since learning behaviour on the part of the employer, will reduce their uncertainty and hence discrimination. In firms with hierarchically organised ILMs, however, early statistical discrimination may have irreversible effects, since it is difficult to catch up with someone already higher in the promotion ladder. Furthermore, in a society with a deeply rooted tradition of male chauvinism, it may be perfectly rational for the employers to treat the sexes unequally since equal treatment might interfere with the smooth, non-conflicting functioning of the firm (male employees may be reluctant to take and execute orders from females).

The three case studies undertaken to distinguish which of the two dominant competitive theories of discrimination seemed more plausible, could not lend support to the labour supply hypothesis. Marriage and children variables in an earnings function among women did not have the expected negative and significant coefficients. Moreover, in a regression among single people, the sex coefficient was hardly reduced. Statistical theories of discrimination, on the other hand, could not be refuted by the

evidence. This is hardly surprising, however, since one expects that demand based theories should fare better in demand oriented internal labour markets.

In general though, labour supply and statistical theories of discrimination may indeed be complementary. Women may well get less pay than men (in the same occupations) because they work with less intensity, and because they have been statistically discriminated in the early years of employment (by being offered less training and lower promotion prospects than men), which makes catching up difficult.

CHAPTER 5

CONCLUSIONS AND AGENDA FOR FUTURE RESEARCH

In the last twenty years, human capital theory can undoubtedly be considered as one of the most fertile research areas in economics. The fundamental notion of human capital - of forgoing current income for the sake of increased future earnings - has been used to explain why people acquire additional education or training, why they migrate abroad or to the urban centres, why they purchase health care, why they decide to have many children instead of a few, why they spend a lot of time searching for the best possible job, or even more ambitiously, why women receive less remuneration than men (because of their family responsibilities, women may invest less in on-the-job training than men, and hence, get less pay).

In the field of education, the principal theoretical implication of human capital theory is that the demand for post compulsory education is responsive to variations in the private rate of return to educational investment, that is, variations in the direct (tuition fees) and indirect (earnings forgone whilst at school) private costs of schooling, and to the earnings differentials associated with different levels of schooling.

It should be kept in mind, however, that human

capital theory does not claim that private returns are the only determinant of the demand for education. Sociological explanations based on historical or institutional factors and on status, prestige and power considerations may be acknowledged as being of some importance, provided they do not conflict with the dominant human capital (rate of return) explanation. In this sense, however, human capital and sociological explanations can be better thought of as complements rather than substitutes. Furthermore, high private rates of return to, say, university education do not imply that everyone will seek to acquire a university degree. For some people, the non-pecuniary (psychic) costs of going to university may be high relative to the pecuniary net benefits or, alternatively, they may have a strong attachment to certain types of work which do not require higher educational credentials. Moderate changes in the salaries in the market will have little impact on the career choice of these types of people. The decisions of the "average" individuals, however, with no strong commitment to a particular job or career, are expected to be influenced by variations in the pecuniary (rate of return) incentives.

In an effort to see whether human capital theory, on its own, can explain the phenomenon of "over-education" in Greece, private rates of return to university education are calculated for the Banking and Civil Service sectors of

Greece (sectors which employ a large proportion of university degree holders).

In chapter 2 it is seen that state legislation which

- (a) does not pose any time limit upon the completion of higher degrees,
- (b) does not render attendance at lectures and classes compulsory,

(c) awards a rigid premium to all degree holders, enables employees in the Greek public sector to complete their university studies whilst working, minimising their indirect costs of education (earnings forgone) and allowing them, in effect, to realise large returns to their educational investment.

Even more significantly, the state, unable to provide postgraduate courses, introduced an additional piece of legislation which allowed university graduates to register automatically as third or fourth year students of another first degree. Since a graduate can complete his second first degree whilst working, without incurring any indirect costs (besides the psychic costs of studying and taking up exams), he can realise infinite returns to his investment decision to undertake a second first degree (assuming, of course, that he has higher promotion opportunities and hence higher pay possibilities as compared with the holder of a single degree).

The interesting feature of the large private rates

of return to university education in Greece, is, therefore, that they do not stem from the much superior earnings of university graduates as compared with secondary school graduates, but rather from the fact that state legislation allows the minimization of costs (earnings forgone) of the educational investment. This, in turn, will lead to the following prediction. Even if the earnings of degree holders in the private sector are much higher than those in the public sector, rates of return calculated separately for the private sector will not necessarily exceed those for the public sector, since an employee of a private firm has no incentive to acquire a university degree whilst working, simply because he has no guarantee that such an act will entail higher earnings. Rates of return to higher education in the private sector may well be lower than rates in the public sector, even if the earnings in the former are higher than those in the latter. The "signals" that these two returns produce may, therefore, be at odds with each other.

Large private rates of return to university education in the public sector can not only account for the phenomenon of "over-education" in Greece, but are also expected to reinforce the social pressures for further expansion of the higher educational system and the State Bureaucracy. Even more, they will encourage further migration flows from the countryside to the urban centres where the educational institutions and the public sector jobs are mostly located.

All the above will cause continuous headaches to the politicians, whose legislation, directed to satisfy popular demands, is at the root of all these problems. Measures to reduce the private rate of return to university education, although essential from a social viewpoint, are unlikely to be put forward, unless, of course, the power to make decisions on educational matters is transferred to a body which is relatively insulated from political pressure.

While the private rates of return to education have been the alternative that human capital theory offered as an explanation of the private demand for education, in the field of educational planning, the human capital alternative has been the social rate of return to education. Educational provision is considered to be a typical investment project and hence the costs and benefits of this project have to be taken into account. The social benefits are the increased productivity of the more educated people, which is approximated by the wage differential between the various educational levels. On the cost side, the direct costs of educational provision (in buildings, staff salaries, etc.) and the indirect ones (the earnings forgone whilst at school) have to be included. Resources are therefore to be allocated to levels of education so as to equalise the marginal social rate of return on educational investment and, furthermore, this equalised yield should not fall below the yield on alternative social or private investments. Social rates of return to education have been criticised on

many grounds (see Introduction), but the most devastating criticism has come from the proponents of the so-called "screening" or "signalling" hypothesis which basically challenges the view that earnings differentials, even if standardised for differences in ability or socio-economic background, measure the social benefits of education. The basic ingredients of the signalling hypothesis are the following: Employers prefer to hire more than less educated workers, not because they possess cognitive skills (which are acquired through on-the-job training), but because they possess certain personality traits like achievement drive, stability of employment or compliance with organisation rules, which are directly related to the worker's potential trainability. These desirable attributes cannot be known with certainty at the time of hiring and the employer, therefore, concerned with selecting job applicants in terms of their trainability, is tempted to treat educational qualifications as a "screening" device to sort out new workers in terms of these attributes. (It should be kept in mind that not only educational qualifications, but also alternative traits, like race or sex, can be used as screening devices). According to the signalling hypothesis, therefore, the social rate of return to education is a rate of return to a particular occupational selection mechanism and the use of intereducational earnings differentials in calculating the social benefits of education, is unwarranted.

This version of the screening hypothesis runs into

the difficulty that it accounts for, at best, the starting salaries and not for the earnings of long term employees in different firms. An employer has every opportunity, with long term employees, to acquire independent evidence on job performance, without continuing to rely on educational qualifications. Yet the evidence has shown that the correlation between earnings and length of schooling, which the screening hypothesis predicts will fall with successive years of work experience, actually increases, a fact difficult to explain by this version of the screening hypothesis.

A stronger version of "screening", however, surmounts these difficulties by assuming that the sorting - out, in terms of educational qualifications, takes place at the entry ports of hierarchically organised and departmentally based "internal labour markets". Especially in the first grades of the job ladder, promotion is governed exclusively by seniority provisions and hence the loss of one grade at the hiring point may well have irreversible effects, since a less educated person has fewer opportunities than a more educated one to "catch up" on the promotion ladder. In this sense, discrimination in terms of educational qualifications may well have durable effects.

While the dispute between the human capital theory and the screening hypothesis has figured prominently in the literature of the economics of education, human capital (or labour supply) and screening or statistical theories

have also been the two major theoretical frameworks advanced to explain the sex differential in earnings (which is the subject matter of Chapter 4).

The human capital explanation of the sex differential in earnings (in the same occupations) is that women work with less intensity and invest less in on-the-job training, as compared with men, because of their household responsibilities and hence, get less pay.

Screening or statistical theories of sex discrimination argue, on the other hand, that the sex differential in earnings is the result of the employer's uncertainty about the women's stability and/or work intensity. Hiring is an investment under uncertainty and employers use sex as a "screening" device to sort out workers in terms of potential stability or work intensity.

As in the case of education, it has been argued that statistical theories of discrimination can only explain differential starting salaries between the sexes, since learning behaviour on the part of the employers will reduce their uncertainty and hence discrimination. In firms with hierarchically organised ILMs, however, early statistical discrimination may, once again, have irreversible effects since it is difficult to catch up with someone already higher in the promotion ladder. Furthermore, in firms with ILMs, equal treatment of the two sexes may well interfere with the efficient functioning of the firm. (Male employees born into a society with deeply rooted traditions of

male chauvinism may be reluctant to take orders from females).

The three case studies undertaken (using sample data on white collar employees of three firms in the Greek Manufacturing Industry) to distinguish which of the two dominant theories of discrimination (human capital and statistical theories) fared better in the context of ILMs, could not lend support to the human capital predictions.

Marriage and children variables in an earnings function among women were not found to have the expected negative and significant coefficients. Moreover, in a regression among single people, the sex coefficient was hardly reduced. Statistical theories of sex discrimination, though, could not be refuted by the evidence.

As in the case of education, human capital theories placing a lot of emphasis on the supply side and statistical theories placing their emphasis on the demand side, may well be complements rather than substitutes. Women may well get less pay than men (in the same occupation) because they work less intensively or because they have chosen to invest less in on-the-job training, and because they have been statistically discriminated against in the early years of employment (by being offered less training and promotion possibilities than men), which makes "catching up" difficult.

Unequal pay for the same occupation is not the only type of labour market discrimination. Occupational segregation, that is, the concentration of women in lower

paid occupations, might be another form of labour market discrimination. Human capital theorists, following the family division of labour argument, insist that this is a result of the individual choice of women, since they expect to be "secondary" earners (especially after marriage). Statistical theorists argue, on the other hand, that employers' uncertainty about the potential stability or work intensity of women, is responsible for assigning them to jobs (occupations) with relatively less responsibility and hence lower pay.

Labour market discrimination in the form of occupational differentiation is very difficult to pinpoint and quantify however, since it is virtually impossible to distinguish between discrimination produced in the labour market and sex role discrimination in the home or schools. (which in turn might have been influenced by direct market discrimination).

The concept of the "internal labour market", which figured so prominently in the discussion of the signalling hypothesis, is the subject matter of chapter 3.

According to Doeringer and Piore (with whom the ILM concept is usually associated), ILMs are the result of

(a) enterprise specific skills and

(b) employers' investment in on-the-job training.

Technology gives rise to "enterprise specific skills" which can most efficiently be acquired by on-the-job training. Since the firm's investment in the employee has a better chance of being amortized, the longer the employee stays

with the firm, the employer has every incentive to stabilise employment and reduce turnover so that he can reap the benefits of his investment in on-the-job training.

This human capital explanation of the origins of ILMs was not found to be entirely convincing, however. There is no evidence to suggest that a change in technology leads to enterprise specific skills, that is, the skills useful to only one employer. There is some evidence, on the other hand, that ILMs are associated with the size of the enterprise. In this sense, ILMs can better be thought of as the result of organisational constraints that increasing firm size imposes on personnel policies. As the firm grows in size, its planning horizon is extended to ensure a better utilisation of the large capital investments incurred. Such planning requires stability and control over input markets, including labour. Increasing emphasis on stability implies that maintenance and control of work effort, loyalty and morale are the prime objectives of personnel policies. External recruitment and abuse of seniority provisions seem to interfere with the pursuit of these aims for which the internal labour market provides an optimum environment. The incumbent employee receives on-the-job training, which probably increases identification with the firm and inculcates the characteristics of loyalty, stability and resistance to unions.

In the presence of ILMs the distinction between "general" and "specific" training, in terms of who finances

the training, loses its meaning. If a firm is assured about the potential stability of an employee, it can behave as if all training were specific, whatever its content (i.e. bear the burden of the training costs, even if some of it may be useful to other employers).

With respect to wage determination, the predictions of ILM theory are twofold:

- (a) The permanent employment relationship, which is the salient characteristic of ILMs, and the presence of fixed costs of training, abrogate the equality of the marginal product of labour and the wage rate at each period of time. The above equality is reduced to an equality between the discounted present value and productivity streams calculated over the distribution of expected employment tenure within the enterprise.

Prediction (a) was recognised long ago by human capital theorists like Becker and Oi and says no more than that the neoclassical prediction of the equality between the wage and marginal productivity in each time period has to be modified into an equality between labour costs (wages plus training costs) and productivity over the entire working life of the employees.

- (b) The organisational imperatives, which necessitated

the formation of ILMs (control and maintenance of high and steady levels of work effort and loyalty), imply that firms with ILMs are prepared to pay a premium for these intangible characteristics over the entire working life of their employees.

The real difference, therefore, between the human capital theory and the internal labour market theory lies in wage determination, i.e. the ILM theory allows for the possibility that two identically qualified people, with the same amount of on-the-job training, the same ability and socioeconomic background (and the same age), receive different wages if the one is employed in an ILM during all his life while the second has served more than one employer.

Leaving aside wage determination, it has been argued that firms with ILMs do not create sufficient (optimal) employment opportunities because they have a tendency to substitute capital for labour (since they have to pay a premium to maintain employment stability). There seems to be considerable evidence, though, that large firms (with ILMs) operate with enough manpower slack to handle unpredictable variations in demand and also secure a reservoir of labour competing for promotion. It does not follow, therefore, as many believe, that small or medium-sized firms are able to provide more employment opportunities than bigger firms (with ILMs).

Besides these theoretical considerations, some selective criteria are established to test for the presence of ILMs and are applied to a four company sample of white collar employees drawn from the Greek Manufacturing Industry. The evidence showed that the clerical job clusters of these firms were associated with strong ILMs.

The treatment of ILMs in the present thesis can by no means be considered to be exhaustive. There are still numerous questions begging for answers. We can recommend the following list of items for a research agenda which, we hope, will contribute to our further understanding of the functioning of ILMs.

- (a) If we accept the proposition that ILMs are associated with the size of the enterprise, what is the size of firm (in terms, for example, of the number of people employed) which necessitates the adoption of hierarchical promotion ladders ? Even more, what is the proportion of the workforce employed in ILMs ?
- (b) What is the shape of the age-earnings profiles inside ILMs ? If wages (or salaries) depend basically on seniority provisions, is it natural to expect that the earnings of university graduates inside ILMs rise steeply during the early years of employment, a fact consistently

corroborated by aggregate Census data ? Additionally, are these profiles levelling off during the working life of the employees and if they do so, at what age are they stabilised ?

- (c) Even if promotions are in general governed by seniority provisions, ability considerations also play a part. It is a quite common feature of personnel policies that in the early years of employment virtually everybody is promoted to the next grade, in the minimum time required for doing so. The higher we move on the job ladder, however, the more selective personnel policies become. It would be interesting to know at which point on the job ladder ability factors outweigh seniority considerations. Moreover, there is some evidence (drawn from my experience of ILMs in Greece), that those who are not promoted to the higher grades receive, nevertheless, salary increases which reduce the earnings gap between the grades (with the obvious intention of maintaining morale within the firm). The relation between grades and salaries is another area which requires further research efforts.
- (d) Although ILMs are associated with low turnover rates, there is some external recruitment besides

the hiring point. At which point in the hierarchical structure can we trace the incidence of the "flyovers" ? Is it, for example, more common at the highest grades of the hierarchy ?

- (e) ILMs provide economists with a golden opportunity to study the process of technology creation. Big firms (with ILMs) usually operate their own R. & D. departments, the operations of which can be directly observed. Research in this area will, hopefully, provide answers to questions like:
Is technology exogenously or endogenously determined ? Is it capital or labour intensive ? To what extent does it respond to changes in the prices of factors of production ?
- (f) Personnel departments of firms with ILMs can also provide answers to questions like
 - (i) how jobs are designed and redesigned;
 - (ii) whether there are economies of scale in providing on-the-job training;
 - (iii) how training costs vary for groups of employees with different educational levels, which, in effect, will allow the calculation of the social rate of return to education as proposed by "screening" theorists like Thurow.

- (g) The extent and degree of unionisation inside ILMs is another area in which further work is needed. Are unions more common among white collar or manual employees ? Are employees of firms with ILMs reluctant to join unions because of their superior earnings and relative employment security ?

It becomes clear, after reading the items of the research agenda presented above that

- (i) firm specific rather than aggregate data are required. The opening of personnel files and the direct study and scrutiny of personnel policies becomes essential for our understanding of ILMs. Undoubtedly, firms are not keen to provide evidence on their policies to individual researchers, so government sponsored and government encouraged projects are therefore needed;
- (ii) an interdisciplinary approach is needed. Economists should consult researchers from such diverse fields as organisation theory, personnel management, industrial psychology and industrial relations. In particular, the work of organisational theorists¹

1. The work of the so-called Carnegie school is a good example of the work undertaken in organisational theory.

may be particularly helpful to economists doing work on ILMs.

An elaborate and serious investigation into the workings and functionings of ILMs necessitates, therefore, a shift to what H. Leibenstein¹ called micro-micro economics. In his own words:

Given that most sciences have moved from the study of less to more micro aspects, it would seem reasonable to cultivate this area in economics - especially to study intra-firm units and intra-firm individual behaviour. But in addition to following a general scientific trend, there are intrinsic reasons to intensify our work in the micro-micro area. A body of work already exists, which suggests ways of studying these problems in greater depth. We should take advantage of the fact that we can observe intra-firm behaviour and study such behaviour intensively And last but not least, it would seem natural at this stage to pursue work on micro-micro elements in order to check the consistency of the implications of what we know and what can be learned about intra-firm behaviour with the postulates and implications of mainstream micro theory. ²

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1. H. Leibenstein, "A Branch of Economics is Missing: Micro-Micro Theory", Journal of Economic Literature, June 1979, pp. 477-502.
 2. Ibid., p. 499.

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